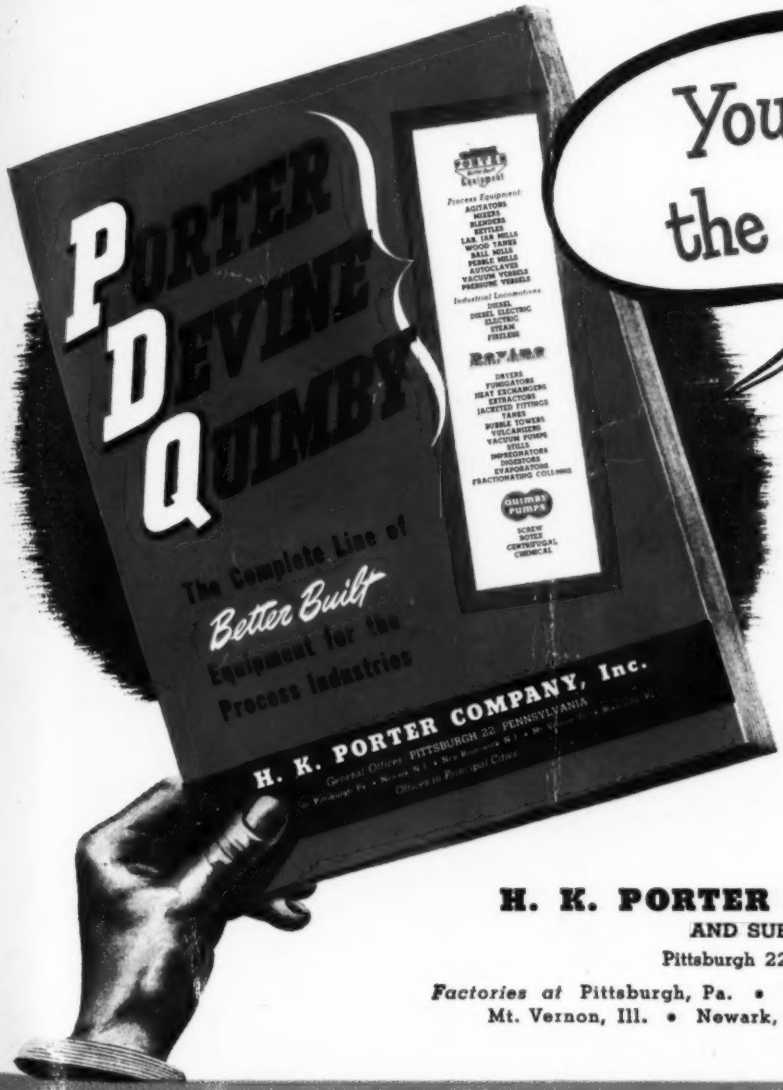
SEP 27 1944

PAPER TRADE JOURNAL

SEPTEMBER 21, 1944



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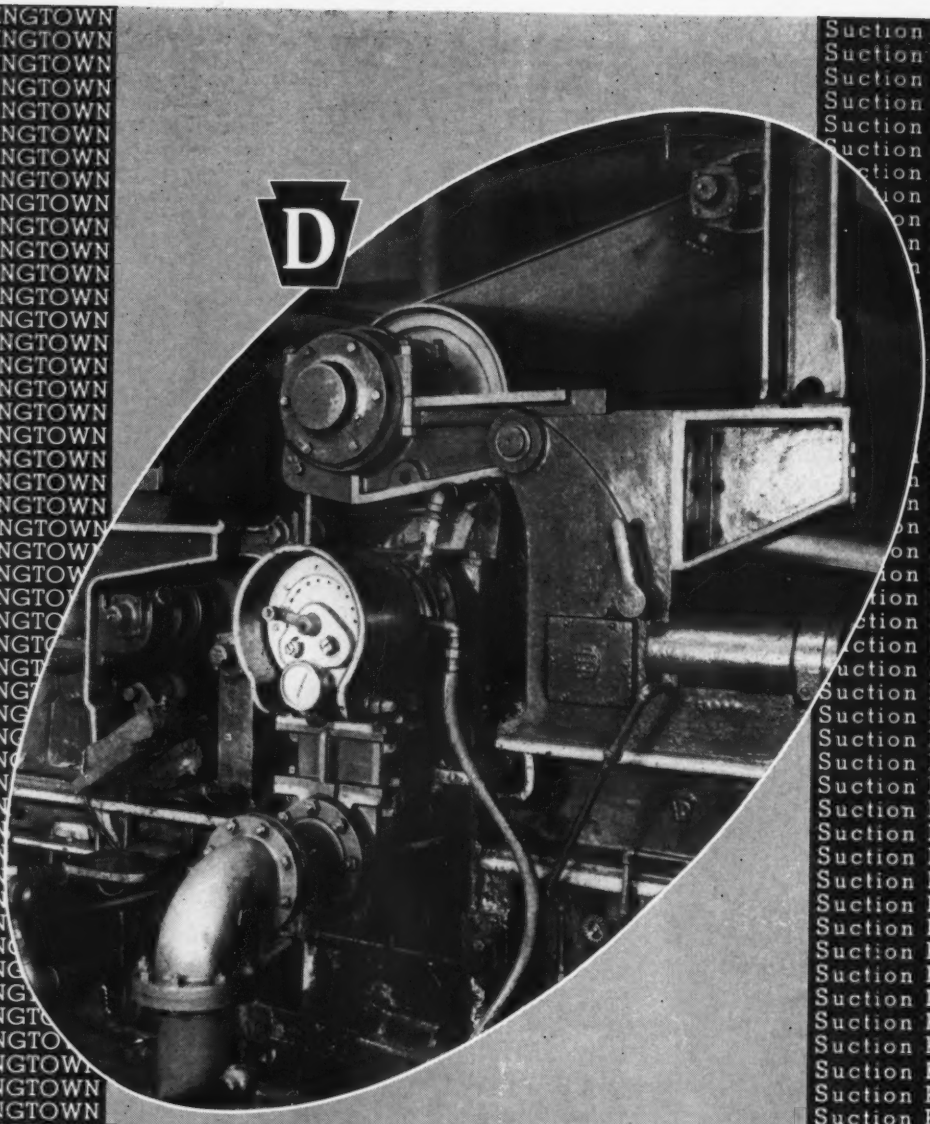

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LYNN M. LAMM
Washington Correspondent
All of 15 W. 47th St.

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CONTENTS

SEPTEMBER 21, 1944

	PAGE
Joint Committee on Printing Makes Awards	7
U. S. Technical Progress Leading Germany	8
Consolidated Co. Building Dam Apron	8
Kimberly-Clark Using Synthetic Rubber	8
Safety Advisory Committee Meets	8
Vote Against Local Union	8
Colleagues Honor Dr. Zon	8
Marathon Chemist Discusses "DDT"	8
Reviews Newsprint and Pulp Situation	10
War Progress and Paper Outlook	10
Forest Laboratories Study New Problem	10
"Paper Holiday" is Mooted	10
Saskatchewan is Considering Building Mill	12
Preparing for Pulpwood Harvest	12
Expect Continual Gain in Paper Products	12
WPB Paper Division Changes	12
Donald H. White Dead	12
Financial News	16
New York Stock Exchange	16
New York Curb Exchange	16
Re-Negotiation Petition Granted	16
Southeastern Division to Meet	16
A Correction	16
July Paper Shipments Lower	16
Carter-Rice Appoints New Manager.	16
Declare Paper Holidays	22
Backlog of Orders Heavy	22
To Hold Wood Conference	22
New TAPPI Members	23
Goes with Carter, Rice & Co.	23
Schumacher Nets 40 Cents	23
Editorial	24
Coming Events in Paper Industry	24
Paper Output Rises	24
C. H. Child Takes Over in New England	25
Production Ratio Report	25
Paperboard Operating Ratios	25
Miami Valley Div. Elects Officers	25
Latest Market Review	38
Miscellaneous Markets	40
Market Quotations	40
Classified Advertising	44

Technical Section *("TAPPI")*

Some Aspects of Alpha-Cellulose from Wood Pulp	27
Heat Resistant Coatings	29
Resinous Ion Exchange Applications	30
The Demineralization of Water by Ion Exchange	33

PAPER TRADE JOURNAL IS INDEXED IN INDUSTRIAL ARTS INDEX

INDEX TO ADVERTISERS ON PAGE 50

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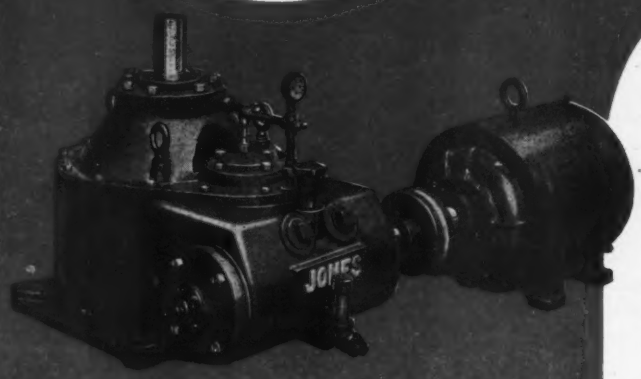

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Vol. 119, No. 12

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

September 21, 1944

Joint Committee on Printing Makes Awards

Let Contracts For Furnishing the Government Printing Office At Washington, D. C., With Paper For the Three Months' Period Beginning October 1—No Bids Received On Large Number of Items.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 18, 1944—The Joint Congressional Committee on Printing made awards today for paper for the use of the Government Printing Office for the three months period beginning October 1. When proposals were opened on September 18, no bids were received on Nos. 6, 18, 23, 24, 27, 29, 42, 43, 49, 50, 52, 60, 62, 63, 64, 65, 66, 67, 68, 69, 70, 72, 75, 77, 84, 85, 104, 109, 111, 120, 121, 122, 123, 125, 126, 140, 141, 153, 160, 161, 168, 169, 176, 185, 195, 201, 202, 209, 213, 217, 218, 219, 252, 254, 255, 265, 302, 303, 304, 306, 308, 309, 351, 360, 367 and 369. The awards were as follows:

No. 1. Marquette Paper Company, at ceiling price (600,000 pounds).

No. 2. Bermingham & Prosser Company, 5.38 cents (wooden plugs).

No. 3. Marquette Paper Company, 7.98 cents.

No. 4. Marquette Paper Company, 7.89 cents.

No. 5. Marquette Paper Company, 7.89 cents.

No. 7. Mudge Paper Company, 7.09 cents.

No. 8. Mudge Paper Company, 7.09 cents.

No. 9. Mudge Paper Company, 7.09 cents.

No. 10. Central Ohio Paper Company, 7.35 cents.

No. 19. Paper Corp. of U. S., 8.69 cents (500,000 pounds); North American Pulp & Paper Co., 8.68 cents (100,000 pounds).

No. 20. Wilcox-Walter Furlong Paper Co., 7.56 cents (400,000 pounds); North American Pulp & Paper Co., 7.80 cents (200,000 pounds); Central Ohio Paper Co., 7.57 cents (300,000 pounds).

No. 22. Mead Sales Co., Inc., 7.18 cents.

No. 26. Whitaker Paper Co., 14.94 cents.

No. 33. R. P. Andrews Paper Company, 7.69 cents.

No. 34. R. P. Andrews Paper Co., 7.33 cents.

No. 37. Barton, Duer & Koch Paper Co., 6.47 cents.

No. 38. Barton, Duer & Koch Paper Co., 7.04 cents.

No. 39. Barton, Duer & Koch Paper Co., 6.55 cents.

No. 41. Consolidated Water Power & Paper Co., 6.56 cents (thickness .0032).

No. 44. Mead Sales Co., Inc., 5.80 cents (600,000 pounds); Marquette Paper Co., 5.75 cents (400,000 pounds); Old Dominion Paper Co., 5.7988 cents (400,000 pounds); Old Dominion Paper Co., 5.8944 cents (400,000 pounds).

No. 45. Whitaker Paper Co., 7.17 cents (400,000 pounds); R. P. Andrews Paper Co., 7.24 cents (500,000 pounds).

No. 46. Cauthorne Paper Co., 8.25 cents.

No. 47. Aetna Paper Co., 9.56 cents.

No. 48. R. P. Andrews Paper Co., 12.83 cents.

No. 51. Millcraft Paper Co., 6.40 cents (200,000 pounds); Frank Parsons Paper Co., 6.40 cents (400,000 pounds)

No. 55. Whitaker Paper Co., 7.69 cents (800,000 pounds); Marquette Paper Co., 7.85 cents (700,000 pounds).

No. 56. R. P. Andrews Paper Co., 7.27 cents (500,000 pounds); Barton, Duer & Koch Paper Co., 7.25 cents (500,000 pounds).

No. 57. Barton, Duer & Koch Paper Co., 6.72 cents (150,000 pounds); Central Ohio Paper Co., 6.79 cents (100,000 pounds); Mudge Paper Co., 7.11 cents (400,000 pounds); Marquette Paper Co., 7.6145 cents (350,000 pounds).

No. 58. R. P. Andrews Paper Co., 6.99 cents (1,000,000 pounds) Butler Co., 6.59 cents (360,000 pounds); Marquette Paper Co., 7.03 cents (640,000 pounds).

No. 59. Marquette Paper Co., 8.54 cents (700,000 pounds) (No. 32); Marquette Paper Co., 8.09 cents (No. 36).

No. 71. North American Pulp & Paper Co., 10.25 cents (200,000 pounds); Graham Paper Co., 9.90 cents (200,000 pounds); Old Dominion Paper Co., 10.997 cents (100,000 pounds).

No. 73. North American Pulp & Paper Co., 11.25 cents (50,000 pounds).

No. 76. Barton, Duer & Koch Paper Co., 18.90 cents (50,000 pounds); Old Dominion Paper Co., 17.987 cents (50,000 pounds).

No. 78. Barton, Duer & Koch Paper Co., 18.90 cents (30,000 pounds); Old Dominion Paper Co., 18.236 cents (50,000 pounds).

No. 101. Rejected.

No. 102. Rejected.

No. 103. Rejected.

No. 105. Aetna Paper Co., 16.46 cents.

No. 106. Aetna Paper Co., 14.36 cents (400,000 pounds).

No. 107. Aetna Paper Co., 14.36 cents (400,000 pounds).

No. 108. Aetna Paper Co., 14.36 cents (400,000 pounds).

No. 110. Aetna Paper Co., 14.86 cents.

No. 128. Barton, Duer & Koch Paper Co., 24.00 cents.

(Continued on page 18)

U. S. Technical Progress Leading Germany

Field Representative of Alien Property Custodian Office Declares Fox River Valley Mills Are In Advance of Paper Chemistry and Production In Enemy Countries — Colleagues Honor Dr. Zon.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 18, 1944—Technical processes in Fox River Valley paper mills are in advance of the latest developments in paper chemistry and production in enemy countries, particularly Germany, according to Edward A. Ribal, technical field representative of the Alien Property Custodian office in Chicago.

Mr. Ribal spent a day in Appleton, Wis., last week to confer with paper mill executives and officials at the Institute of Paper Chemistry. He came to the valley on instructions by James E. Markham, alien property custodian, to determine why applications have not been made by manufacturers in the valley for royalty-free and non-exclusive patent and patent applications seized by the federal government from foreign nationals when war broke out.

No applications from valley paper mills for any of the alien property paper patents have been made, Mr. Ribal reported, since those patents available are technically inferior to those already in operation here.

Consolidated Co. Building Dam Apron

The Consolidated Water Power and Paper Company is employing about thirty men on a construction job at Du Bay dam, where an apron is being built. Work will continue until about December 1. It was started early in July.

The company is doing the work with its own crew, at a cost estimated at about $125,000. George Marcoux is the superintendent in charge.

The apron will be in sections below each of the 11 gates. Each section will extend 80 feet down stream from the gates. About 8,000 cubic yards of concrete are being poured. The apron has a series of stepped blocks which break up the force of the water coming over the dam. The design in use was tested in model tests at the University of Wisconsin hydraulics laboratory, and it is in fairly common use throughout the country on large dam construction.

An island down stream from the dam is being removed and part of the material is being washed and crushed for use in the concrete for the apron. Removal of the island will permit the river to flow more freely from the dam.

Kimberly-Clark Using Synthetic Rubber

Kimberly-Clark Corporation, Neenah, Wis., is using synthetic rubber in large scale production, manufacturing sanitary belts with elastic webbing from Neoprene, since last March.

Neoprene, a black, gummy rubber, in its raw state, has been developed by rubber thread manufacturers' research men so that it can be converted into an elastic webbing equally satisfactory with webbing produced from natural rubber. However, the job of developing the synthetic product for use in the Kimberly-Clark Corporation's manufacture of sanitary belts was not an easy one, and it was only within recent weeks that a straw-colored thread came from the research laboratories.

Before the development of this straw-colored thread, only black threads were possible, since color appeared to weaken the Neoprene. The necessity for covering the black threads to produce a finer quality webbing was an expensive procedure.

Safety Advisory Committee Meets

The advisory committee of the Twin City Safety Council will elect officers and make plans for the fall program Tuesday afternoon, September 19 at the Menasha, Wis., vocational school. A general chairman will be named to succeed Francis Rooney, who has resigned to accept another position.

Among the members of the advisory committee are Walter Strong, Marathon Corporation; Joseph P. Zelinski, Wisconsin Tissue Mill; Herman J. Goffin, Bergstrom Paper Company; Don Severson, Neenah Paper Company; Ed Page, Kimberly-Clark Corporation; Clarence Elmgren, Gilbert Paper Company; R. M. Sensenbrenner, Whiting Paper Company, and R. E. Sell, John Strange Paper Company.

Vote Against Local Union

Employees of the Gilbert Paper Company, Neenah, Wis., have voted against the local of the International Brotherhood of Papermakers as its bargaining agent by a margin of one vote. The vote was reported unofficially as 152 to 151.

Colleagues Honor Dr. Zon

Forty colleagues of Dr. Raphael Zon, who since 1923 has been director of the United States Forest Service's Lakes States experimental station at St. Paul, Minn., honored him last week at the Wisconsin hotel, Milwaukee, Wis., the occasion being his retirement.

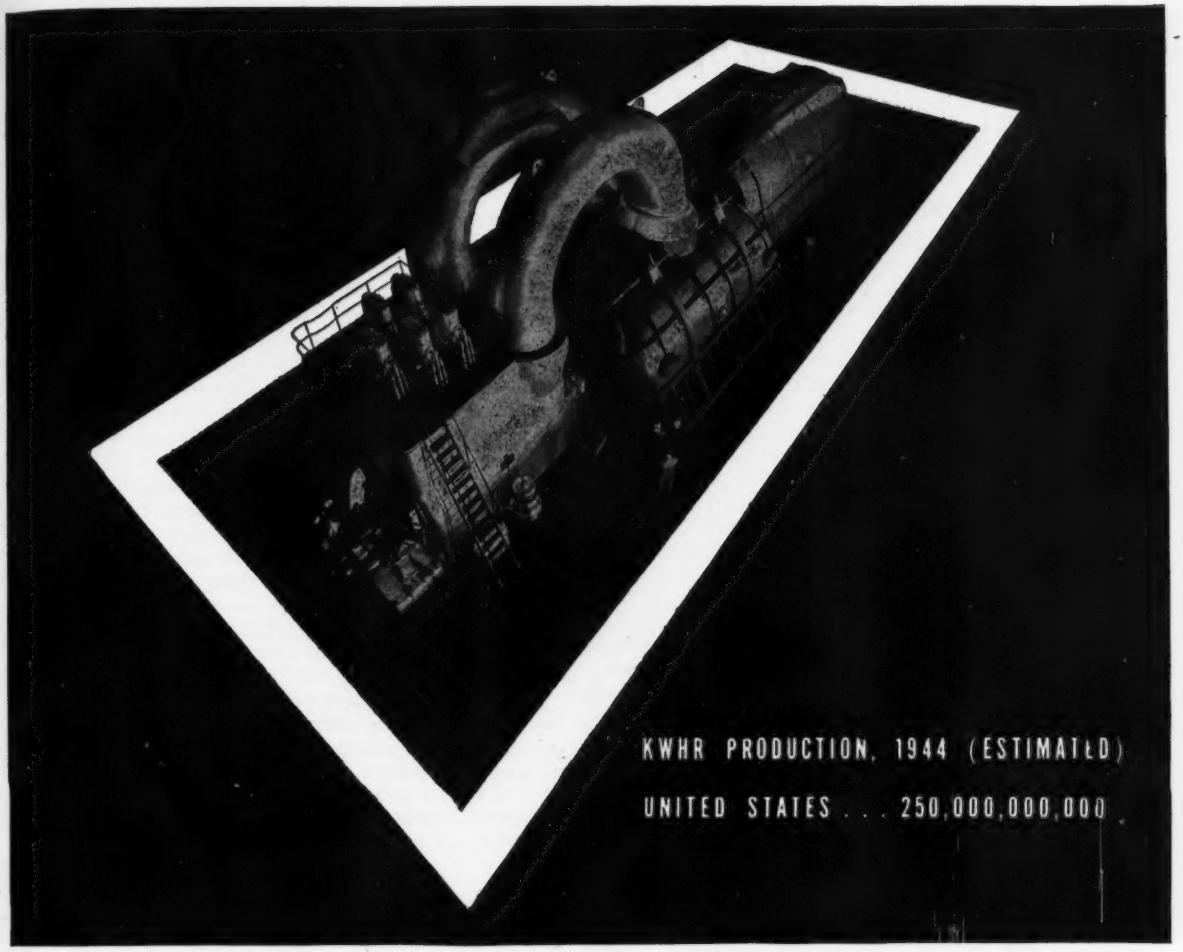
Jay H. Price, Milwaukee, regional forester, reviewed Dr. Zon's professional career, which began in Russia, where he received his technical training. Two years before he was naturalized in this country he joined the federal forest service in 1901 as research man. He has remained in that division of the service longer than any other man.

Dr. Zon has written 210 scientific papers on forestry, dealing with many phases of silviculture. He is known widely as an exponent of the idea that every land owner should be a forester and that the use of forests and woods is closely linked with the economic and social welfare of the average citizen.

Stanley F. Wilson, assistant regional forester presented the retiring director with an album of photographs depicting the forestry projects with which he has been associated. Elwood L. Demmon, Dr. Zon's successor, was present.

Marathon Chemist Discusses "DDT"

George J. Brabender, chemist of the Marathon Corporation, in a recent address before the Wausau Kiwanis Club, Wausau, Wis., discussed recent chemical developments, including the new de-lousing powder known as "DDT," which played a big part in preventing typhus. He also discussed a number of new sealing films, and the synthetic rubber program in the United States.



Power facts

make pleasant reading for the Allies!

This year U. S. power plants will produce over 250 billion kilowatt hours of electricity, as compared to an estimated 94 billion for Germany and German-occupied countries, and 30 billion for Japan.

America's war production has never been limited or hampered by lack of electric power —and this in spite of a huge increase in domestic requirements for electricity, and shortages of men and maintenance materials.

Gulf is proud to have played a part in this outstanding record of the U. S. power industry. For a large percentage of steam turbines —the principal source of the power for our war industries—are lubricated with Gulfcrest Oil, the world's finest turbine oil, which has established outstanding performance records in leading power plants.

Gulfcrest Oil is one of an important group of high quality petroleum products Gulf has developed for industry. If you have a problem in any way connected with the use of a petroleum product, Gulf is well prepared to give you effective help in its solution. Write, wire, or phone your nearest Gulf office today and ask a Gulf Service Engineer to call.

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Reviews Newsprint and Pulp Situation

Joint Meeting of War Production Board and Canadian Prices Board Affecting Delivery To U. S. States New Wood Is Above Original Estimate—War and the Paper Outlook—Forest Laboratories Busy.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., September 18, 1944—The newsprint and wood pulp situation, as affecting supplies from Canada to the United States, has been reviewed at a meeting in Montreal between Canadian Prices Board officials and representatives of the United States War Production Board, and at this meeting the American representatives were assured that Canada will be able to maintain the current rate of shipments to the United States during the fourth quarter of 1944. These shipments are at the rate of 200,000 tons of newsprint a month and 1,100,000 tons of woodpulp a year. On behalf of the Prices Board it was stated that although severe drought conditions in various pulp and producing areas of Canada had resulted in the inability of certain mills to obtain full delivery of wood in time for its use during the coming winter (due to low water interfering with the driving of logs), this deficiency had been somewhat offset by the fact that the production of new wood during the season ended May 31, 1944, exceeded the original anticipated new supply. "This factor, coupled with rigid methods taken to schedule production, ensures a continuation of newsprint and pulpwood deliveries for the balance of 1944," said the Prices Board.

War Progress and Paper Outlook

With the rapid progress being made in what are confidently regarded as the closing phases of the war in Europe, there is increasing speculation here regarding the possibilities of Scandinavian competition with Canadian pulp and paper in the markets of the world and particularly in the United States market. There are those who hold that, due to the need for re-establishing industries and creating employment, Scandinavian competition will be more severe than ever. On the other hand many hold the belief that for some years at any rate this competition will not be nearly so great as before the war. They base their belief on these factors:

1.—There has been enormous destruction by the Germans of the most valuable forests in Norway, Poland, Yugoslavia, Romania and Slovakia, where all scientific methods of forestry have been thrown overboard, whole forests being cut down regardless of consequences and no measures taken to ensure re-afforestation, and in addition Sweden has been exploiting its forests to the limit for all sorts of uses.

2.—The call for timber and other forest products from the war-ravaged countries of Western Europe will be so great that there will be little European surplus for overseas export.

3.—So many surprisingly new uses have been found for the use of wood and wood pulp products that there will be a wider field than ever for all pulp and paper producers.

Forest Laboratories Study New Problems

According to the Hon. T. A. Crerer, Minister of Mines and Resources for Canada, the immense amount of work in connection with the war which has been done by the Dominion Forest Laboratories will be of inestimable value in carrying out reconstruction and rehabilitation projects. There are three of these laboratories—one in Montreal (under the name of the Pulp and Paper Research Institute), one in Ottawa and one in Vancouver. The demands on these laboratories from the various fields of war activities have been so great, he says, that for the past three and a half years practically their entire activities have been devoted to the war effort.

Mentioning a few of the many and varied problems dealt with by the Laboratories, he said: "The onset of war immediately created a tremendous demand for wood and wood products, a demand complicated by the fact that many of the species involved were not available, or were in short supply, as a result of the exigencies of war. In these cases, the Laboratories were able to advise to as which of the available species would be most satisfactory as substitutes and the wider knowledge of certain native species thus forced on the notice of industry will undoubtedly react to the advantage of Canada's forest industries after the war. Another field lay in the use of wood as substitute for steel and other materials needed for strategic purposes: in this connection the extensive use of veneer and plywood construction with various synthetic bonding agents gave rise to a great variety of problems in which the Laboratories were enabled to be of material assistance both to the war departments and to the industries concerned. This is another case where lessons learned as part of the bitter fruits of war will play a tremendous part in the peaceful world to come.

"The transport of munitions and supplies brought up a variety of packaging problems, practically all of which involved in one way or another the use of wood or wood products. This was a field in which the Laboratories had many years' of pre-war experience to draw on, and as a result they have been able to provide specifications for containers which, in many cases, provided a superior product with marked economy of material.

"Other activities of the Laboratories which might be mentioned are the investigation of producer-gas as a substitute for gasoline in motor vehicles, study of production of industrial alcohol from wood waste, and the testing, both for government departments and for private industry, of many thousands of samples of materials, in both the wood and the metal-working trades."

"Paper Holiday" is Mooted

Serious consideration is being given by responsible officials in Montreal to the initiation of a "paper holiday" in connection with the giant city-wide waste paper drive to be held on the nights of October 2 and 4. A paper holiday is one in which all stores arrange that on a day set they wrap only essential purchases for their customers. It is explained that this really comes under the head of paper conservation, but that as paper conservation and salvage are inseparable, such a day would impress upon the public the extreme importance of waste paper to the war effort.

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For better paper quality

1. Accurate maintenance of machine speed.
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4. Freedom from dirt, grease and oil.

For better operating efficiency

5. Less outage time for washing up, changing wires and machine clothing and making other machine adjustments.
6. Reduction of outage time for drive maintenance.
7. Reduction of off-quality paper.
8. Better accessibility and improved working conditions — improved crew efficiency.

For lower operating cost

9. Elimination of line and countershafting, belts and open gearing, with consequent saving in power cost.
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11. Longer wire and clothing life.
12. Reduction in maintenance requirements of both paper machine parts and drive equipment.
13. Reduction in fire hazard.
14. Saving in floor space, both back of the machine and in the basement.

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When you specify a Westinghouse Sectional Motor Drive, you are assured of the best results. This drive is designed and built to meet the requirements of *your* particular machine.

It makes no difference what class of paper you have in mind; what size, type or speed of the machine, there is a Westinghouse Sectional Motor Drive to meet every requirement. For complete information, write for a copy of Bulletin 3045. Or, if you prefer, phone our nearest office and ask our representative to call. There's no obligation, of course. Westinghouse Electric & Manufacturing Co., Dept. 7-N, East Pittsburgh, Pa. J-94632

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SECTIONAL MOTOR DRIVE FOR PAPER MACHINES

Saskatchewan is Considering Building Mill

Provincial Minister of National Resources States His Government Is Studying Possibilities of Pulp and Paper Production—Prepare For Season's Pulpwood Cutting—Future Gains In Paper Products Seen.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., September 18, 1944—Because most large pulp and paper mills are located convenient to low-cost water transport, considerable interest is attached to the announcement of J. L. Phelps, new provincial minister of national resources for Saskatchewan, that his Government is "considering" construction and operation of a pulp and paper mill in that Province. Timber stands are available in the Northern reaches of the great prairies province, but to get the finished products out to outside markets there is the long rail transport. To confine its operations to serving local markets only would not seem to be a profitable enterprise for the present stage of development of the West. The proposition is interesting, too, because of its possible significance in indicating a trend towards public ownership in the West, where the belief seems to be quite general that far too much of the surplus earnings of the prairies goes to the manufacturing East for products that could be made in the West. Pulp and paper would not seem to be the most likely products on which to make a start, in the opinion of those close to the industry in this part of the country.

Preparing for Pulpwood Harvest

Preparations are well under way for the season's pulpwood cutting operations. There is some hope that the improvement shown in last year's operations may be continued this year. The manpower situation is still acute and will remain so at least until the harvest has been gathered across the Dominion. Early in the war, most of the larger pulp and paper companies attempted to carry on woodcutting operations as far as possible throughout the year, but during this last summer operations have been completely suspended in an effort to cooperate with the Government in getting the maximum number of men for agriculture. The Government, in return, will, as soon as the harvest season is over, give assistance in directing men to the woods for employment. This cooperation between the Government and industry last year resulted in an increase in the pulpwood cut substantially beyond estimates for the season. There were 30% more men in the woods last season than the season before, which enabled the industry to produce more pulp and newsprint for export. If the combined efforts of the pulp and paper industry and the federal authorities succeed in getting into the woods this season as many men as last year, it should help out considerably in the current shortage of pulp products in the United States.

Expect Continual Gain in Paper Products

Business men agree that the post-war period should show a continual increase in the use of paper products. It is pointed out that although there will be an immediate slump in the use of paper by government agencies as soon as the war ceases and some of the controls are liquidated, what remains of bureaucracy will require more paper than before the war. Moreover, an increase in the use of commercial papers by private enterprise is expected because of the general uplift in business efficiency made necessary during hostilities. Modern merchandising and packaging methods should also account for a greater use of paper products when business settles down to normal competition.

WPB Paper Division Changes

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 20, 1944—Two new appointments and two resignations in the Paper Division by the War Production Board were announced today:

Walter H. Wilcox was named director of the Paper Division, effective September 16, 1944, by Harold Boeschenstein, acting director of the Forest Products Bureau. Mr. Wilcox succeeds Rex W. Hovey, who is returning to his company, the Oxford Paper Company of New York. Mr. Hovey will continue his association with the Paper Division as a special consultant.

Mr. Wilcox has been with WPB since August 14, 1944, serving as deputy director in charge of the Fine Paper Branch. He has an extensive experience in the paper industry, having been associated since 1930 with the S. D. Warren Company of Boston. He is now on leave of absence as assistant to the president of that company.

James L. Madden, who has been in charge of the Pulpwood Branch of the Paper Division since November, 1943, is returning to his company, the Hollingsworth & Whitney Company, Boston, Mass. Mr. Madden has consented to serve as consultant of the Pulpwood Branch.

Mr. Madden's position will be taken by Curtis Hitchins, who has had several years' experience in the pulpwood field. For the last several months he has been in charge of pulpwood production in the northeast section of the United States. Mr. Hutchins comes from the Dead River Company, Bangor, Maine, and is now on leave from that company.

Donald H. White Dead

Donald H. White, who passed away at his home in New Orleans on August 31 after an illness of several months, was a graduate of Colby College and Massachusetts Institute of Technology. He was in the research department and later was chief power engineer for the Brown Company at Berlin, N. H., from the time he graduated from college in 1914 until 1932. During that period he spent two years in the Chemical Warfare Service of the United States Army, engaged in research and manufacturing work in war gases. In 1932 he left the Brown Company to become chief power engineer for the Bogalusa Paper Company, presently the Gaylord Company at Bogalusa. In 1938 he became associated with the Standard Supply Company of New Orleans in charge of its steam and power supply department.

Mr. White is survived by his parents, Professor and Mrs. C. H. White of Waterville, Maine, his wife, a daughter who is a Spar and a son who is located in New Orleans.

for paper-mill motive power

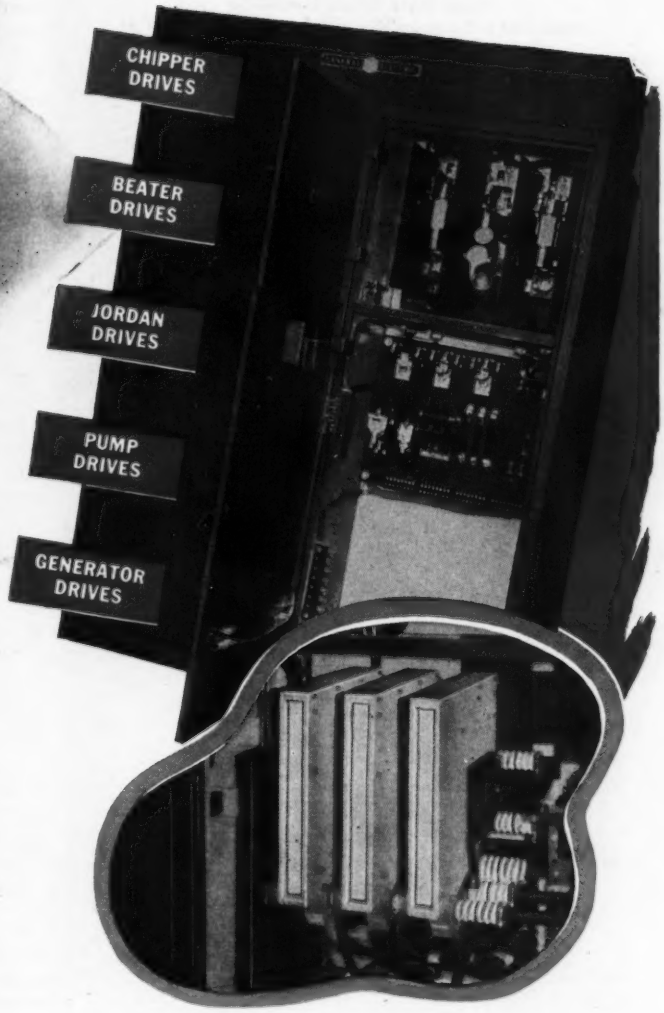
Want a double measure of protection for high-voltage motors? These modern, factory-built G-E cubicles reduce the risks of interrupted production in two ways:

1. To safeguard motor operation, a long-lived, air-break contactor provides sure starts and stops. Overload and undervoltage protection is matched to the motor characteristics.

2. To protect the control as well as the motor, "designed in" EJ-2 fuses combine high interrupting capacity with split-cycle response to short-circuit currents. No matter how bad the "short," these fuses hold fault-current peaks to levels which cannot damage the contactors or other control parts.

Equally important is the *well-proved practicability* of this metal-enclosed combination of long-lived contactors and EJ-2 fuses from the standpoints of accessibility, cleanliness, appearance, and protection of personnel. Installed individually or in a group, this high-voltage control typifies the kind of electrical modernization that *saves* as it serves.

G-E engineers with a keen understanding of paper-mill problems will help apply these starters as a part of a co-ordinated power distribution system, along with substations, switchgear, and other a-c and d-c apparatus right from the turbine through to the drive motor. Why not discuss your modernization plans with them now? *General Electric Co., Schenectady 5, N. Y.*



These complete-protection starters can be used with motors ranging from 50 hp to an upper limit ranging from 300 hp (for motors with high locked-rotor currents) to 700 hp (for motors with low locked-rotor currents). Available for starting and protection of squirrel-cage induction motors, two-speed squirrel-cage induction motors, wound-rotor motors, and synchronous motors—for full-voltage, reduced-voltage, reversing, and dynamic-braking service. (Lower view shows air-break contactors mounted behind panel in lower section.)

HIGH-VOLTAGE CONTROL FOR PAPER MILLS

BUY ALL THE BONDS YOU CAN
AND KEEP ALL YOU BUY

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending September 16, 1944

STOCKS

	High	Low	Last
A. P. W.	4	3¾	3¾
Armstrong Cork Co.	43¾	42½	43¾
Celotex Corp.	13⅜	13¼	13⅜
Celotex Corp., pf.	18½	18⅜	18½
Certain-Teed Products Corp.	6¾	6¼	6⅜
Certain-Teed Products Corp., pf.	108	104¼	105¾
Champion Paper & Fibre Co.	26¾	25¾	26⅛
Champion Paper & Fibre Co., pf.	112	111¾	111¾
Congoleum Nairn Co.	25¼	24⅜	24⅞
Container Corp. of America	26	25¼	25¾
Continental-Diamond Fibre Co.	11⅛	10¾	10¾
Crown-Zellerbach Co.	18⅜	18¼	18½
Crown-Zellerbach Co., pf.	102¾	101¾	101⅞
Dixie Cup Co.	19½	18¾	19½
Dixie Cup Co., —A.	47½	47	47⅛
Flintkote Co.	23¼	22⅛	22½
Flintkote Co., pf.	...	...	...
Robert Gair	4⅝	4¼	4½
Robert Gair, pf.	15½	15½	15½
International Paper Co.	19⅜	18¾	19⅛
International Paper Co., pf.	83¼	82¼	83¼
Johns-Manville Corp.	97¼	96	96¼
Johns-Manville Corp., pf.	...	...	...
Kimberly-Clark Corp.	37⅜	37⅛	37⅜
Mac Andrews & Forbes	29½	29½	29½
MacAndrews & Forbes, pf.	...	...	...
Masonite Corp.	44½	42¾	43½
Mead Corp.	11¾	10½	11¼
Mead Corp., pf. A—6%	99⅞	99⅞	99⅞
Mead Corp., pf. B—5½%	86½	86	86½
National Container Corp	11⅛	10	10½
Paraffine Companies, Inc.	53	52¼	53
Paraffine Companies, Inc., pf.	106	106	106
Rayonier, Inc.	16¾	16	16¾
Rayonier, Inc., pf.	31⅞	31⅛	31⅞
Ruberoid Co.	32¾	31¾	32½
Scott Paper Co.	42⅛	40½	42⅛
Scott Paper Co., pf.	112¼	111½	112
Sutherland Paper Co.	29¼	29	29
Union Bag & Paper Corp.	12⅞	12	12¾
United Paperboard Co.	6½	6⅛	6⅜
U. S. Gypsum Co.	78½	77½	78½
U. S. Gypsum Co., pf.	179⅞	179⅜	179⅞
West Virginia Pulp & Paper Co.	23	21½	22
West Virginia Pulp & Paper Co., pf.	108¼	108¼	108¼

BONDS

Abitibi Pulp & Paper Co. 5s '53	86⅜	84½	84½
Celotex Corp. 3¾s '55	...	...	...
Certain-Teed Products Corp. 5½s '48	102	101¾	101¾
Champion Paper & Fibre Co. 4¾s '50	...	...	...
International Paper Co. 6s '55	104	103½	103½
International Paper Co. 5s '47	...	...	...
Mead Corp. 3½s '53	...	...	...
West Virginia Pulp & Paper Co. 3s '54	...	...	...

New York Curb Exchange

High, Low and Last for Week Ending September 16, 1944

STOCKS

	High	Low	Last
Great Northern Paper Co.	34¾	34	34½
Hummel-Ross Fibre Corp.	7¾	6⅞	6⅞
St. Regis Paper Co.	5⅞	5¾	5¾
St. Regis Paper Co., pf.	...	...	...
Taggart Corp.	5¾	5¾	5¾

BONDS

American Writing Paper Co. 6s '61	100½	100	100½

Re-Negotiation Petition Granted

Chas. M. Haskins, Managing Director of the National Association of Waste Material Dealers, Inc., has been advised by the Secretary of the War Contracts Price Adjustment Board in Washington that that association's petition requesting the exemption from renegotiation of dealers in waste material under the provisions of subsection (i)(4)(D) of the 1943 Renegotiation Act, has been granted. This will be covered as a part of paragraph 845 of the Renegotiation Regulations and will read as follows:

Pursuant to the authority given to the War Contracts Price Adjustment Board by subsection (i)(4) of the Renegotiation Act of 1943, the Board, under the provisions of subsection (i)(4)(D) of the 1943 Act, has exempted from renegotiation amounts received or accrued during fiscal years ending after June 30, 1943 and prior to July 1, 1944 under contracts or sub-contracts for the making or furnishing of the following articles:

Iron scrap and steel scrap; non-ferrous metal scrap; woolen waste, including woolen rags and clips, new and old; scrap rubber; waste paper; cotton or linen rags, including old bagging and old rope; and textile waste; sold by dealers or brokers.

The above paragraph is sufficiently comprehensive to cover the entire waste material industry and it was specifically understood that Textile Waste would include Cotton Waste.

Southeastern Division To Meet

The fall meeting of the Southwestern Division of the American Pulp and Paper Mill Superintendents Association will be held on October 27 and 28 at the Poinsett Hotel in Greenville, S. C. This is the first meeting since last fall and it is intended to make it a good one.

The meeting will get underway on Friday morning and end on Saturday night (or Sunday morning). There will be a day and a half of concentrated and instructive programs. There will be one-half day given over to golf at the Greenville Country Club, and two evenings given over to entertainment. On one evening there will probably be a country square dance with a demonstration from an outstanding mountain square dance team, all to the tune of real mountain music. On the second evening there will be a banquet and dance at the Poinsett, which is noted as South Carolina's finest hotel. The hilarity will be led by Harry Hulmes who guarantees no dull moments. There will be as little speaking as possible

For the ladies there will be something doing all of the time.

A Correction

The Combustion Engineering Company, Inc., writes as follows: "Your September 7 issue contains an article 'Brazil is Building a Pulp and Paper Mill Estimated to Cost $10,000,000.' In the portion of this article entitled 'American Equipment Supplied' you have a paragraph referring to the boilers in which you designate them as 'cross drum, sectional header B. & W. boilers, designed and built by the Combustion Engineering Company.' This obviously is an error. The Babcock & Wilcox Company had nothing to do with this installation. As your paragraph states, the boilers were designed and built by us."

July Paper Shipments Lower

WASHINGTON, D. C., September 20, 1944—July index of the value of paper mill shipments was 161 compared with 177 for June and 155 for July of last year taking a 1939 average month at 100 according to the monthly industry survey of the Department of Commerce.

July index of the value of paper mill inventories was 142.1 compared with 139.8 for June and 134.9 for July of last year according to the tabulation, also taking an average month of 1939 at 100.

Carter-Rice Appoints New Manager

BOSTON, Mass., September 18, 1944—E. J. ("Joe") Canning, well known in the Boston trade and for many years associated in the sales and merchandising activities of Carter, Rice & Co., has been appointed manager of its Duplicator Paper Department.

F. D. Pratt, formerly manager of this department, is no longer connected with the Company.

IN SERVICE EIGHT YEARS

Still Going Strong

Back in 1936, four cylinder machine forming vats made of ARMCO Stainless Steel were installed in a midwestern paper mill. During a recent inspection they were termed in perfect condition—"just as good as they were when they were put in."

Although the mill uses acid in wash-up, and considerable quantities of alum and bleach in their processes, there is no evidence of corrosion.

ARMCO Stainless is restricted to necessary replacements now, but many mills are planning to use this smooth rustless metal when peace comes. Stainless is easy to keep clean and free from slime, dirt, rust and scale. It *stays smooth.* Mill men say there is less spotting, less breakage and fewer rewinds when this hard tough metal is used in equipment.

Plan to "put your stock in ARMCO Stainless" after the war. Meanwhile, may we tell you more about the advantages of stainless steel for your processing equipment? Just write to The American Rolling Mill Company, 2331 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

THE AMERICAN ROLLING MILL COMPANY

STAINLESS ARMCO STEEL

JOINT COMMITTEE ON PRINTING MAKES AWARDS

(Continued from page 7)

No. 151. Wilcox, Walter Furlong Paper Co., 8.26 cents.
No. 152. Wilcox, Walter Furlong Paper Co., 8.26 cents.
No. 154. Aetna Paper Co., 14.36 cents.
No. 155. Aetna Paper Co., 14.36 cents.
No. 156. Aetna Paper Co., 14.86 cents.
No. 177. Barton, Duer & Koch Paper Co., 24.00 cents.
No. 183. North American Pulp & Paper Co., 8.50 cents.
No. 184. Whitaker Paper Co., 7.67 cents.
No. 189. Barton, Duer & Koch Paper Co., 13.22 cents.
No. 190. Barton, Duer & Koch Paper Co., 14.22 cents.
No. 191. Barton, Duer & Koch Paper Co., 14.97
No. 192. Barton, Duer & Koch Paper Co., 14.32 cents.
No. 196. Barton, Duer & Koch Paper Co., 23.00 cents.
No. 203. R. P. Andrews Paper Co., 8.57 cents.
No. 205. R. P. Andrews Paper Co., 12.73 cents.
No. 208. Frank Parsons Paper Co., 5.75.
No. 210. Whitaker Paper Co., 5.875 cents (4¾" rolls); Whitaker Paper Co., 5.625 cents (5¾ and 7½" rolls).
No. 211. Paper Corp. of U. S., 9.50 cents.
No. 271. Paper Corp. of U. S., 8.98 cents.
No. 276. Rejected.
No. 277. Rejected.
No. 280. Mudge Paper Co., 10.50 cents.
No. 281. Paper Corp. of U. S., 6.42 cents.
No. 305. Barton, Duer & Koch Paper Co., $44.99 per M sheets.
No. 307. Frank Parsons Paper Co., 5.85 cents.
No. 325. Whitaker Paper Co., 6.22 cents (600,000 pounds); R. P. Andrews Paper Co., 6.17 cents (500,000 pounds).
No. 326. Whitaker Paper Co., 6.22 cents (600,000 pounds); R. P. Andrews Paper Co., 6.17 cents (500,000).
No. 327. Whitaker Paper Co., 6.22 cents (600,000 pounds); R. P. Andrews Paper Co., 6.17 cents (500,000 pounds).
No. 352. Barton, Duer & Koch Paper Co., $18.85 per C sheets.
No. 366. Mathers-Lamm Paper Co., 4.415 cents.
No. 368. Consolidated Paper Co., 5.87 cents.

Joint Meeting at Poland Spring

The Maine-New Hampshire Group of the Technical Association of the Pulp and Paper Industry and the Northeastern Division of the Superintendents Association met at Poland Spring, Maine on September 15-16, 1944. T. E. Barry and H. E. Wallace were in charge of arrangements. W. D. Stroud and Jack Wright directed the sports and entertainment programs respectively.

The Friday program was in charge of the TAPPI Group, Clifford Patch of the Eastern Manufacturing Company, presiding, and consisted of a full day of round table discussions covering hydraulic barking, machine coating, wet strength of paper, post-war byproduct prospects of pulp mills, waste liquor utilization, etc.

On Saturday the Superintendents program included talks by V. A. Zimmer of the U. S. Department of Labor on Safety in Paper Mills, and by W. K. Metcalf of the J. O. Ross Engineering Corporation on Drying and a motion picture showing Mechanized Woods Operation by K. S. Trowbridge, American Pulpwood Association.

A large number of women were present who enjoyed an extensive social program including golf and bridge tournaments, dancing, motion pictures and other entertainment. A get-together party was sponsored by more than sixty companies who supply materials to the industry.

Both organizations held elections. The Northeastern Division elected George Bidwell, chairman; C. L. Ferguson, G. E. Fuller and F. W. Roberts, vice chairmen, and Mrs. Marian L. Stewart, secretary-treasurer.

The Maine-New Hampshire TAPPI Group elected C. W. Patch, chairman, A. D. Wooley of the Oxford Paper Company, vice chairman and H. E. Pratt, Pejepscot Paper Company, secretary-treasurer. The following were elected to the executive committee—W. V. Tarrey, S. D. Warren Company, M. O. Schur, Brown Company, H. Gregory, Maine Seaboard Paper Company and C. Myers, Hallingsworth & Whitney Company.

The joint meeting had the largest attendance recorded for this fall meeting in spite of the hurricane which probably deterred many from attending and prevented many from reaching Poland Spring in time to attend the first day sessions.

N. E. TAPPI to Meet at Pittsfield

The New England Section of the Technical Association of the Pulp and Paper Industry will meet jointly with the Connecticut Valley Division of the Superintendents Association at the Wendell-Sheraton Hotel, Pittsfield, Mass. on October 6-7, 1944.

On Friday afternoon, October 6, there will be visits to the mills of Byron Weston Company, Crane & Co., Smith Paper Company, L. L. Brown Paper Company and the plant of E. D. Jones & Sons Company.

The technical program on October 6 includes the following presentations:

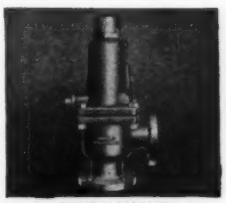
1. The Rag Problem by E. O. Read of Crane & Co.
2. Color Printing of Cotton Fabric (motion picture).
3. Fibers and Chemicals Used in Present Day Fabrics by H. W. Wilkinson, Jr., Southbridge Finishing Company.
4. Present and Future Problems of the Rag Packers by Joseph Schapiro and Representatives of the National Association of Waste Material Dealers.

The Saturday, October 7, technical program is as follows:

1. Stock Preparation by Dwight E. Jones, E. D. Jones & Sons Company.
2. Identification of New Fibers and Chemicals in Rag Cuttings by F. L. Simons, Miss Marjorie Pyne and Miss Margaret Lynch, Crane & Co.
3. Round Table Discussion on the Application of Laboratory Tests to Rag Room Operation.

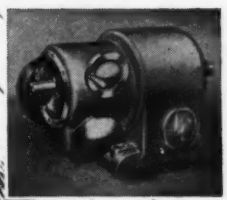
On Saturday afternoon there will be a golf tournament at the Pittsfield Country Club, followed by a get-together party sponsored by E. D. Jones & Sons Company and a banquet.

• LOMBARD is an Important part of the Paper Picture



RELIEF VALVE

CENTRIFUGAL PUMP



VARIABLE SPEED DRIVE

can use New Ideas!

LOOK TO [illegible] WHEN YOU LOOK TO THE FUTURE

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ASHLAND · MASSACHUSETTS

Declare Paper Holidays

WASHINGTON, D. C., September 20, 1944—"Paper holidays" are being declared in cities and towns throughout the country in an effort to stretch limited supplies of paper, the War Production Board announced today. During the "paper holidays," retail merchants will use no bags or wrapping paper, except for articles that require wrapping for sanitary and protective purposes.

The WPB Conservation and Salvage Divisions, in cooperation with the Periodical Publishers National Committee, will sponsor the "paper holidays."

The first "paper holiday" was held in Peoria, Ill., early in July. Not only were large quantities of wrapping and packing materials saved during the holiday, but also paper salvage in Peoria increased 600 per cent as the public expanded its paper consciousness. So successful was the Peoria drive that from a short-term holiday it was extended as a continuing program, officials said.

"Paper holidays" in other cities, based on the Peoria plan, may be declared for one week, one month, or for the duration. Even one day's curtailment in the use of paper will help, WPB officials said.

Howard Coonley, director of the WPB Conservation Division, stressed the need for stringent economies to conserve the nation's waning paper stockpiles. He said:

"Unlike many other wartime shortages, the paper problem shows no evidence of immediate solution even when the war in Europe ends. Enormous quantities of food, equipment and medical supplies will still be needed overseas for our servicemen and for relief to distressed nations. All of these shipments require paper or paperboard for packaging."

Because some dealers still have stocks of packaging materials on hand, the public has not yet felt the pinch of shortages, officials said. With the ever-increasing paper needs for the armed services and essential home products, still further cuts must be anticipated in the near future, they added.

Harold Boeschenstein, acting director of the WPB Forest Products Bureau, commented:

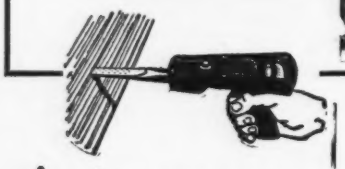
"Military requirements of woodpulp for production of such products as explosives and high tenacity rayon for ties, as well as for overseas packaging and other uses, have reached the highest point of the war and are expected to step up in war theaters throughout the world.

"Substantial improvements in pulpwood production and waste paper collections during the first half of 1944 were not sufficient to balance the demands, despite further WPB curtailments in supplies of paper for civilian uses."

Three groups of retailers — food, drug and variety stores—throughout the nation have already signed a WPB pledge to conserve bags and wrapping paper. Now paper holidays provide a unique method of bringing all retailers in every community into the conservation campaign.

"If the 'paper holiday' has not come to your town, local merchants who are anxious to cooperate, may secure a paper holiday kit containing detailed instructions and suggestions for organizing the campaign, from the Executive Secretary of their State Salvage Committee," the WPB Conservation Division said.

MINIMIZE REGISTER TROUBLES



The Cambridge Printers' Moisture Indicator tells at a glance whether or not the moisture content of the paper and the room are in balance. Thus the printer knows when it is safe to run. He can cut storage time to a minimum and avoid register troubles. Recommend the use of this instrument to your customers. It will reduce off-register complaints.

Send for Bulletin

CAMBRIDGE INSTRUMENT CO., INC.
3732 Grand Central Terminal, New York, N. Y.

CAMBRIDGE
PRECISION INSTRUMENTS

Backlog of Orders Heavy

INDIANAPOLIS, Ind., September 20, 1944—Nothing is apparent just now to confirm the belief of some members of the industry that demand for paper from Government sources will be eased by the first of the year. Govenrment demand is as heavy now, or heavier, than it has been and the volume of paper available for civilian uses continues to diminish to some extent. The backlog of orders continued heavy last week and there is nothing to indicate that it can be cleaned up. Until demand from government and quasi-government sources is eased, there is no bright future for the domestic paper user.

With the heavy fruit and vegetable crop harvests coming to an end manufacturers of containers for these industries likely will have some time to give for production of other items. Every effort was made this year to conserve containers and to reuse them, but the campaign was not wholly a success. The demand for shells for the brewery trade was exceptionally heavy this summer and the demand is continuing on into the fall. The last week saw some decline in demand for containers for the ice cream trade, but it will take some really cold weather before this amounts to anything much. Many of the ice cream stands, which open for the summer months, now are closing, but the trade by drug stores has increased.

Wrapping paper and bags were in heavy demand last week with the supply limited. Tissues moved well and there continued to be a heavy call for cleaning tissues. Building paper and roofing demand continued good with prospects for a continued demand during most of the fall and until severe temperatures curtail construction.

To Hold Wood Conference

A conference on New Developments In Wood Products will be held at the New York State College of Forestry, Syracuse University, on Friday and Saturday, October 6 and 7. The program includes a list of timely topics presented by outstanding authorities in specialized fields of wood utilization.

A considerable number of wood products industries and other organizations including the U. S. Navy will maintain a series of instructive exhibits at the conference. A special feature of these exhibits will be demonstrations of wood transformations, recently developed wood-treating processes, and new designs and types of wood products.

A special feature of the conference will be a conducted tour of the pulp and paper plant of the college. This plant is the only one of its kind in the United States, and represents an investment of almost a half million dollars. It will be in operation on a special war project at the time of the conference.

New TAPPI Members

The executive committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Earl M. Brennan, assistant general superintendent, Waxed Paper Divisions, Pollock Paper and Box Corporation, Dallas, Tex., a 1926 graduate of Tufts College.

Miss Julia Coolidge, chemist, Remington Rand Company, Bridgeport, Conn., a 1937 graduate of Mt. Holyoke College.

Samuel L. Foster, chief engineer, Kalamazoo Vegetable Parchment Company, Kalamazoo, Parchment, Mich., a 1909 graduate of Mississippi State College.

Victor F. Keilhauer, chemical engineer, a 1943 graduate of the Massachusetts Institute of Technology.

Latour R. Kendall, purchasing agent, the Gardner-Richardson Company, Middletown, Ohio, a 1932 graduate of the University of Cincinnati.

Robert S. Magruder, groundwood superintendent, St. Regis Paper Company, Norfolk, N. Y., a 1939 graduate of Syracuse University, reinstated as an associate member.

Samuel P. Moore, technical assistant, Brunswick Pulp and Paper Company, Brunswick, Ga.

Salvatore Morice, chief chemist, Sitroux Incorporated, New Hartford, N. Y.

Maurice O. Neilson, chief engineer, Alliance Paper Mills, Ltd., Merriton, Ont., Canada, a 1912 graduate of the University of Stockholm.

Thomas J. Phillips, chemist, Missisquoi Corporation, Sheldon Springs, Vt., reinstated as an associate member.

Glen T. Renegar, assistant superintendent, Container Corporation of America, Philadelphia, Pa.

Eric A. Rinell, engineer, International Paper Company, Niagara Falls, N. Y., a 1928 graduate of the University of Minnesota.

M. E. Stern, technical director, Mid-Western Division, National Starch Products, Inc., Chicago, Ill., a 1918 graduate of the Case School of Applied Science.

Enrique Tinman, chemical engineer, W. R. Grace & Co., Lima, Peru, a 1943 graduate of Escuela de Ingenieros.

George A. Zinkil, research chemist, Container Corporation of America, Chicago, Ill., a graduate of Iowa State College.

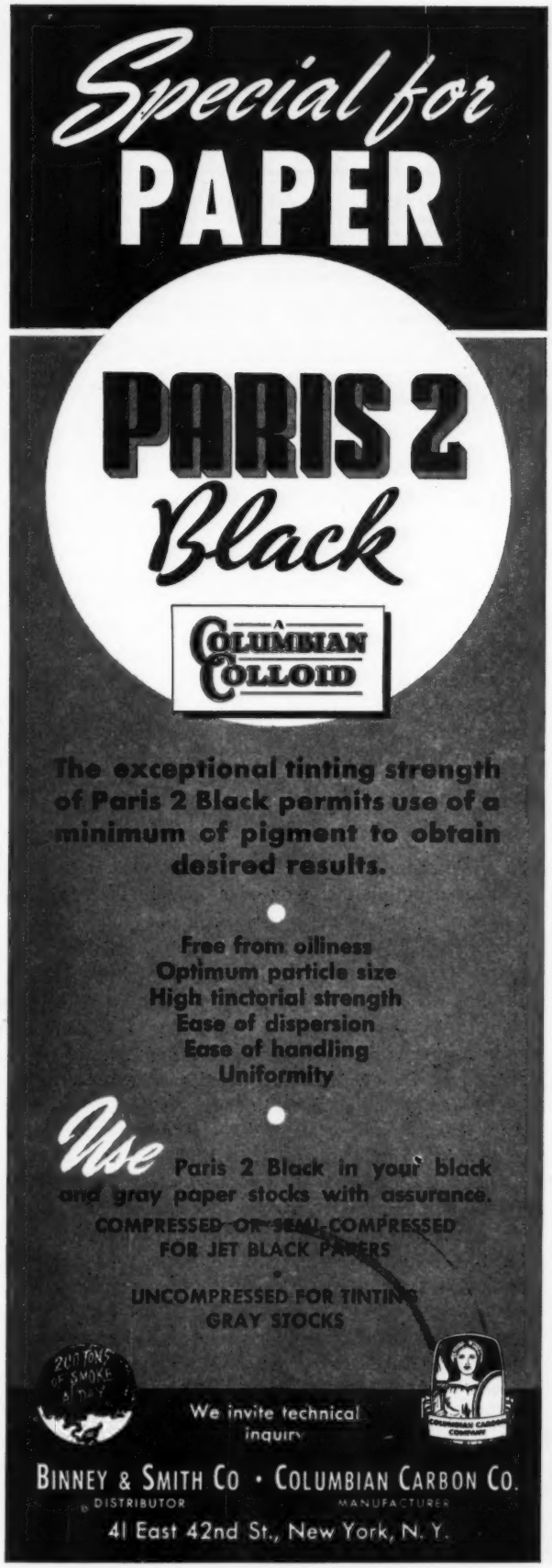
Goes With Carter, Rice & Co.

BOSTON, Mass., September 18, 1944—Milton H. Broome has joined the sales organization of Carter, Rice & Co., Corporation, with headquarters at 144 Westminster street, Providence, R. I.

"Milt" has made a host of friends in the Providence area since starting in the paper business twelve years ago. He is highly regarded in the trade, having risen to the position of sales manager with his recent connection.

Schumacher Nets 40 Cents

The Schumacher Wall Board Corporation for the quarter to July 31, reports a net income of $40,025, or 40 cents a common share, against $35,715, or 32 cents a share, a year before.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PARIS 2
Black
A COLUMBIAN COLLOID
The exceptional tinting strength of Paris 2 Black permits use of a minimum of pigment to obtain desired results.
Free from oiliness
Optimum particle size
High tinctorial strength
Ease of dispersion
Ease of handling
Uniformity
Use Paris 2 Black in your black and gray paper stocks with assurance.
COMPRESSED OR SEMI-COMPRESSED FOR JET BLACK PAPERS
UNCOMPRESSED FOR TINTING GRAY STOCKS
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PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger, Editor

COMING EVENTS IN PAPER INDUSTRY

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

Chicago Professional Paper Group—First Monday of each month except July and August at Chicago, Ill.

PAPER OUTPUT RISES

All-over production of paper for the first half of 1944 aggregated 8,620,000 tons, compared with 8,505,000 tons in the same period in 1943, an increase of 1.3%. In its detailed report the Department of Commerce indicates that the greatest increases in output in the half year period, compared with 1943, was distributed as follows: shipping sack, 41.6%; special industrial, 23.5%; absorbent, 12.3%; building 5.1%, and groundwood, 0.40%. Declines in the output of other types of paper were: newsprint, 14.9%; book, 9.0%; fine, 7.6%; wrapping, 1.7%; sanitary, 1.2%, and tissue, 0.9%.

Paper board production for the first half of 1944 totaled 4,473,000 tons, compared with 4,269,000 tons in the same period in 1943, an increase of 4.8%. Increased output this year over 1943 in the several types of paper board are as follows: tube stock, 71.5%; miscellaneous, 50.1%; cardboard, 6.5%; container, 6.3%, and building, 0.5%. The only decline in output was reported in setup boxboard which decreased 12.7%.

In commenting on the supply situation, the Department report states that, the government demand for paper and paper board continued upward in the first half of 1944 but was not fully reflected in orders received by mills because withdrawal from Army-owned stocks resulted in decreased stocks at depots. In June, the report goes on to say, greater demands from the European front found Army inventories in this country reaching minimum quantities and indicated that adequate paper requirements for the armed services were difficult to fill. Many mills were confronted with the need for sharply reducing domestic civilian orders to enable them to meet government needs. This acute situation is now being felt by paper wholesalers and by various classes of domestic industrial consumers, as well as the distribution trades. The amount of wood pulp required for the expanded Army and Navy ammunition program is also much greater than in any previous period and this cuts into the supply available for other purposes.

The newsprint supply situation, as analyzed in the Department report, indicates that the over-all situation provides about 273,000 tons per month during the last half of this year. This estimate takes into consideration Canada's ability to continue its present commitment of 200,000 tons monthly, and Newfoundland and United States mills together supplying 73,000 tons monthly. There seems little doubt, the report states, that Canada will be able to supply 200,000 tons monthly during the third quarter, but this amount may have to be reduced during the fourth quarter owing to drought conditions which have interfered with pulpwood drives. Barring a failure in pulpwood deliveries, available supplies of newsprint in the current quarter and fourth quarter, should total 1,638,000 tons. Consumption by newspaper publishers in the third quarter is estimated at 655,536 tons and during the fourth quarter at 781,166 tons, a total of 1,436,702 tons. Not included in this total are 15,000 tons for appeals and 176,000 tons for all other uses. It is estimated that inventory adjustments may require an additional 19,000 tons. This would result in a deficit of 8,702 tons between supply and requirements during the last half of 1944. Military demands may also cut down the supply in the last quarter.

In reference to groundwood printing and book papers the Department states that, the use of paper for printing purposes by all departments and agencies of the United States Government will be controlled by conservation orders issued by the Bureau of the Budget. This order is expected to reduce annual consumption of paper by the agencies affected by at least 25% of the amount consumed in the yearly period ended June 30, 1942. It affects all papers consumed in printing. Consumption of paper for printing by governmental units is estimated at 600,000 tons annually. It is difficult to forecast the printing paper situation, the report continues, for the fourth quarter but further curtailment in the use of such papers may be necessary before the end of the year. The aggregate amount of paper available after October 1 depends on a continued high level of cutting and delivery of pulpwood to mills, and on waste paper collections.

Fine paper production of 482,000 tons in the first half of 1944, compared with 520,000 tons, the decline of 7.5%, the report points out, was continued in the trend during June.

Wrapping paper supply for civilian use grows progressively tighter, the report states. Proposed mill production by end-user groups for the third quarter indicates that more than 32% will go to military and war plants, against 28% for the first quarter of this year. The supply is sufficient to meet the most essential civilian needs but no paper is available for wrapping not absolutely necessary. Production of wrapping paper in June totaled 167,000 tons, compared with a monthly average of 165,000 tons for the first six months of this year. It is expected that the

output of wrapping paper during the current quarter will be approximately the same as for the second quarter. The shortage of bag paper (not including sack paper for shipping) is as acute as for wrapping and every effort is being made to conserve the supply. Production during June amounted to 31,000 tons, compared with 29,000 tons in May and a monthly average of 32,000 tons over the January-June period. Pulp allocations for the current quarter are expected to reduce output about 15,000 tons below that of the second quarter, but there is a possibility that most if no all of this tonnage may be made up through good weather.

In commenting on converted paper products, the report states in part that, the shortage of shipping containers for civilian use is a critical problem. The unprecedented military demand increases and it is estimated that approximately 500,000,000 V-boxes will be shipped overseas in 1944. Domestic movement of goods is more than 40% greater than in pre-war years and tighter controls in packaging may become necessary .

C. H. Child Takes Over in New England

Due to the resignation of Joseph J. Levis as New England sales manager of Merrimac Paper Company, Inc., with mills located in Lawrence, Mass., Chester H. Child, Merrimac's technical director, has been appointed New England sales manager.

In addition to handling New England sales, Mr. Child will continue his research work as technical director in the Merrimac Laboratory at Lawrence.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1944		Corresponding Weeks—1943	
August 5	90.7	August 7	89.5
August 12	93.0	August 14	92.4
August 19	91.3	August 21	90.9
August 26	93.2	August 28	91.2
September 2	92.8	September 4	90.7
Sept. 9 (Holiday Sept.) 4	*75.8*	September 11	74.6

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1943	87.2	88.9	89.5	88.7	91.4	84.8	84.3	91.0	88.3	89.6	89.6	82.0	87.8
1944	89.6	89.6	89.2	88.8	89.7	92.6	81.7	*92.5*					

COMPARATIVE YEARLY SUMMARIES

	1937	1938	1939	1940	1941	1942	1943	1944
Year to Date	86.4	68.9	78.8	86.2	94.5	92.6	87.9	*89.3*
Year Average	79.8	71.5	83.4	85.6	97.4	90.4	87.8	

*Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

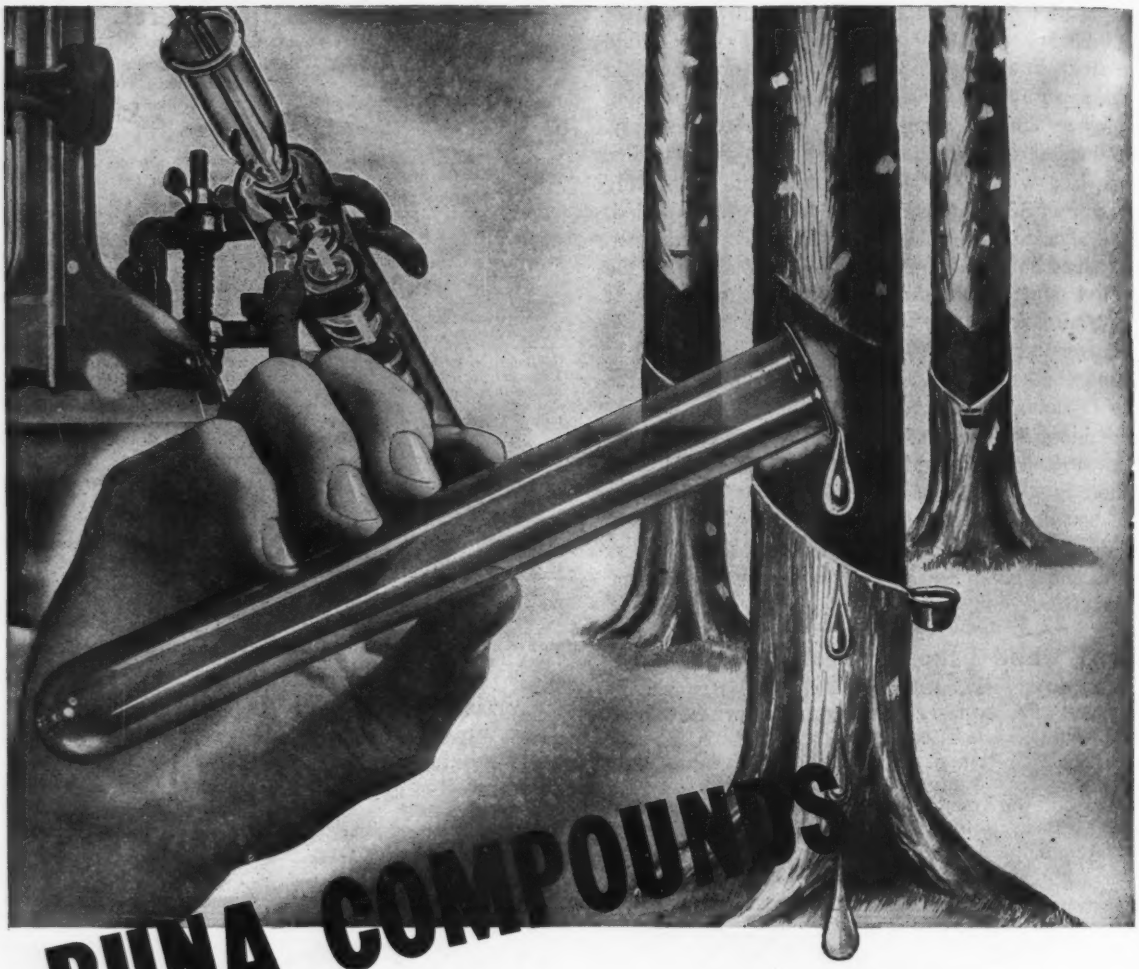
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1938	56	63	63	60	60	59	59	69	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	83	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	88	94	94	96	94	89	96	94	94	93	87	93
1944	90	96	95	96	96	96	85	*96*					

Week ending Aug. 5, 1944—96
Week ending Aug. 12, 1944—96
Week ending Aug. 19, 1944—95
Week ending Aug. 26, 1944—96
Week ending Sept. 2, 1944—97
Week ending Sept. 9, 1944—*80*

†Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

Miami Valley Div. Elects Officers

The following officers were elected at the September 9 meeting of the Miami Valley Division of the American Pulp and Paper Mill Superintendents Association. James J. Andrews, chairman; Harold F. Bennett, vice chairman; Herb A. Braun, Second vice chairman.



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Some Aspects of Alpha-Cellulose From Wood Pulp*

By N. W. Coster[1] and Rex Vincent[2]

Abstract

The determination and importance of the alpha-cellulose content of wood pulp are discussed. It is the authors' opinion that the existing tests are not wholly satisfactory in that they do not indicate all the properties which are necessary in the evaluation of pulp for specified uses.

Alpha-cellulose has been defined as that fraction of the pulp which is insoluble in 17.5% NaOH at 20° C. having a D.P. of 200 or more. The effects on the yield of a product meeting such requirements by the pulping and bleaching processes, and by operating densities and temperatures are given.

Alpha-cellulose has attained an important position in the last few years, in the field of wood pulp, because of the rapidly expanding use of purified wood cellulose. In a number of instances it forms a part of the specifications for the pulp, either directly or indirectly. In the light of the increased use of the term, alpha-cellulose, the procedures for its determination, the commercial processes for obtaining it, and the connection between it and the viscosity of the cellulose would be of interest and perhaps an aid in understanding.

Determination

The use of the Greek letters, alpha, beta, and gamma, for designating the constituents of a pulp goes back to November 1906 and were first used by C. F. Cross of the British firm of Cross and Bevan. At that time this firm was investigating the viscose reaction. The first step in this process concerned the steeping of the pulp in caustic soda solutions and they found it of value to know how much of the pulp would dissolve in this solution. A procedure for determining this was worked out in 1904 using alkali of mercerizing strength, 17%. That portion which did not dissolve was called "A" cellulose; that which was precipitated on neutralizing with acid was called "B" cellulose and that which remained in solution was called "C" cellulose. The "B" cellulose was also called hemicellulose. In 1906 these were changed to alpha, beta, and gamma. By that time the method for determining alpha-cellulose read as follows: Weigh 10 grams, pulp it up with 50 ml. of 17.5% NaOH, allow it to stand 15 minutes, then dilute with 50 ml. of water. Pour at once onto the filter pump and drain thoroughly without dilution. When drained wash six times with 50 ml. of water each time. Drain thoroughly between each washing.

The methods in use today are simply refinements and slight modifications of that original method. There are now in use several different methods for the determination of alpha-cellulose and each one yields a different answer on the same pulp. These differences are primarily due to different mercerizing times and temperatures, filtering technique, ratio of cellulose to NaOH, and exposure of the material to the air during the determination. In the opinion of the authors a good method for the determination of alpha-cellulose should contain the following stipulations:

1. The size of the sample should not be less than 2 grams of pulp.
2. The sample should be in its air dried state without having been subjected to oven drying before testing.
3. The sample should be fluffed or shredded by hand as most mechanical shredders have a tendency to generate heat and tear the fibers during processing.
4. The washing of the alkali cellulose should be done very carefully so that as little oxidation as possible takes place. At no time should the alpha-cellulose pad be sucked dry.

There is no standard method today that contains all these features.

By virtue of this method of isolating it and by the way it came into recognition alpha-cellulose can be defined simply as that constituent of pulp which does not dissolve in 17.5% NaOH at 20° C. This, however, is a tremendous oversimplification and is far from being a satisfying definition. The reality is very complex and a full definition should include something concerning the sisters, beta and gamma. In spite of that there was not much more than that known about the subject up to 1920. About that time work done in Germany and in this country began to square up some of the confusing and contradictory data and as the knowledge became clearer the use of the term and the determination spread beyond the viscose industry. The viscose people continued their interest in the alpha-cellulose content of pulps because it was thought that the higher the alpha the more reactive the pulp toward their process, particularly in the steeping. There was not much attention paid to the beta and gamma fractions since not enough was known about them although the rayon people had recognized that the beta content was an indication of

* Presented at a joint meeting of the Local Superintendents Group and the Technical Association of the Pulp and Paper Industry, Wausau, Wis., April 21, 1944.

[1] Member TAPPI; Technical Director, Soundview Pulp Co., Everett, Wash.

[2] Member TAPPI; Technical Consultant, Bulkley Dunton Pulp Co., Chicago, Ill.

degradation. They believed that these two constituents probably did not exist as such in the wood, but were formed during the cooking and bleaching.

It had been known for years that cellulose of great strength, such as cotton, had very low solubilities in alkaline solutions and that the portion which did dissolve out contributed nothing to the strength. This indicated that the alpha fraction was largely responsible for whatever strength the cellulose possessed. In following through degradations on cotton textiles which occurred during processing, there was developed the measurement of the viscosity of a solution or dispersion of the cellulose. This was first used by OST in 1911 and by 1929 the American Chemical Society had published a standard procedure. During the development of the viscosity test practically all the work was confined to cotton and textiles although the manufacturers of viscose pulp began using the test in order to relate the pulp to the resultant viscose.

Viscosity

The relationship of viscosity to molecular weight has been a most useful tool in the development of the glucose-chain theory of the cellulose molecular structure which is now almost universally accepted. Staudinger's work in that direction has been outstanding and in 1936 he determined that the gamma-cellulose fraction, which remains in solution, included chains with a degree of polymerization up to 10. He further determined that the beta fraction contained chains with a D. P. ranging from 140 up to 200. Thus, the alpha-cellulose portion would have a D. P. of 200 or more. It has been demonstrated that fractions with a D. P. of less than 200 will not form into films nor can they be spun into filaments, hence the alpha fraction is that portion of the pulp which contributes to the tensile strength.

Now, if the considerations mentioned so far are put together, the definition of alpha-cellulose would be as follows: It is that fraction of the pulp which is insoluble in 17.5% NaOH at 20° C., having a D. P. of 200 or more and it is this fraction which contributes most to the physical strength. This could possibly be accepted as a definition, but there is much more that should be known. How much of the alpha has a D. P. in the low range and how much of it is in the upper range? This is important where the pulp is being used as a raw material for viscose rayon, acetate rayon, or some of the other cellulose derivatives. It is not so important where the pulp is being made into paper . . . at least all the available information so far has failed to show a definite relationship between viscosity and strength characteristics and it is probable that papermakers can accept a very wide range in viscosities, but the lower limit is not known since other factors become operative. However, where the pulp is being used as a chemical raw material the condition of the alpha is important. That condition is the result of degradation and it is governed by the manner in which pulp was processed during its manufacture. Some knowledge of the amount of degradation can be obtained from the beta content and it was formerly thought that the copper number was of value in this respect. When cellulose chains break into shorter chains the end groups of the molecules increase rapidly in number and since these end groups possess reducing properties, a measure of the reducing power should indicate the extent to which the chains have been shortened. The copper number procedure of Schwalbe with its modifications was used considerably until the introduction of alkaline bleaching and caustic extraction for increasing the alpha content. Since these two phases of pulp purification came into wide use, particularly for the production of viscose pulp, the copper number has ceased to have any real significance. It is, of course, important that it not be high but when it is low it is rather an indication of the method of processing rather than of cellulose quality.

Effect of Bleaching

The beta- and gamma-cellulose determinations which are almost always made in conjunction with the alpha determination furnish important information about the nature of the alpha fraction and thus, indirectly, about the pulp. These three constituents are peculiar in their relationship to each other in that the beta content and the gamma content alone are meaningless. These two fractions together are the alkaline solubles in the pulp consisting of hemicellulose and variable amounts of polysaccharides based on sugars other than glucose. The beta fraction probably contains hemicellulose, which was in the wood originally, as well as some degraded cellulose produced by the cooking and bleaching process. In an unbleached sulphite pulp, the beta fraction would have very little degraded cellulose in it, nearly all of it being hemicellulose from the wood. The amount of beta in unbleached pulps is no indication of quality since it may be desirable to have a relatively high amount for glassine and greaseproof pulps while those that are cooked for bleaching will have low amounts. The bleaching process can shift the alpha, beta, and gamma relationship in almost any desired direction. It is possible to bleach a pulp with an alpha of 88% and a beta of 4% so that, after bleaching, it will have an alpha of 84% and a beta of 7 or 8%. It is also possible to bleach the pulp so that the alpha will rise slightly with no increase in beta. This indicates careful, intelligent bleaching where the formation of degraded cellulose is slow enough to be balanced by its removal, or the removal of hemi-cellulose. It is obvious in the first example above that the increase in beta consists entirely of degraded cellulose formed by oxidation and hydrolysis during the bleaching process. In the second case, they have been materially reduced by using lower temperatures, pH control, etc. Table I shows how this relationship varies in different grades.

TABLE I

	Unbleached Sulphite (Paper Grade) %	Bleached Sulphite (Paper Grade) %	Rayon Grade %	Cellophane Grade %
Alpha	89.0	88.0	92.0	88.0
Beta	3	5	4	9
Gamma	8	7	4	3

Thus, a high beta content with any given alpha content indicates the condition of the alpha since it is a measure of the severity of the processing which was used on the wood or on the pulp. This holds true when the process is extended to include caustic extraction in order to raise the alpha content into the region which we call "purified wood cellulose." This term includes all pulp with an alpha content above 90%. In order to obtain alpha contents of this order, or higher, it is necessary to do, to a certain extent, exactly what the alpha cellulose determination does—dissolve out the alkali solubles. This is done by inserting a caustic extraction stage some place in the bleaching cycle. The extraction can be done in

either closed or open vessels, at atmospheric pressure or slightly above. The closed vessels using 4 to 6 pounds of steam pressure are to be preferred because of the ease of temperature control and steam accuracy. The temperature and concentration of caustic used will depend on the amount of alpha-cellulose desired in the finished pulp. For a 91% alpha content, the conditions are 190° F. and a caustic concentration of 2% based on the weight of fiber. For an alpha content of 93% it is necessary to increase the caustic to 3 or 4% and raise the temperature to 200 to 210° F. Should it be necessary to raise the alpha to 96% a caustic concentration of 8 to 10% and temperatures above 212° F. would be required.

Alpha-Cellulose

The extraction is also usually made at high densities, of the order of 8 to 16%, in order to reduce the amount of water heated and thus lower the steam costs. However, it should be mentioned that for papermaking purposes, a much stronger and better pulp is obtained, for a given alpha content, when the extraction is carried out at densities of 4 to 5%. Experience has shown that each pulp has a certain optimum refining degree, the peak of which is determined through the superimposition of two reactions: 1. The increase of the alpha content by the dissolving of the hemicelluloses; and 2. The lowering of the alpha content by the reaction of hot alkali on the cellulose in the presence of oxygen. This is the same type of balance which we have mentioned before in connection with beta cellulose, and because of this balance between solvation and formation, the peak alpha content which can be reached by hot refining is about 96%. The fiber loss in refining is high and roughly this will amount to a loss of 3% for every increase in alpha content of 1%. Thus, to go from an alpha content of 88% to one of 92% will entail a fiber loss of about 12% and to raise the alpha to 96%, a loss of 25% or more can be expected.

The bleaching which follows the caustic extraction must be done very carefully for the hot refining seems to render the pulp very sensitive and inclined to lose the alpha which was so dearly purchased. This bleaching is almost always done by hypochlorite bleach liquor strongly buffered by caustic.

In order to go beyond the limit of the hot process, 96% alpha, it is necessary to use cold refining, which according to the patent literature, will carry the alpha up to 98% or 99%. In contrast to the hot process, cold refining is carried out with a highly concentrated liquor running up to 12% which would be quite high if expressed as based on the fiber weight. The temperatures employed range from 20° down to 0° C. One phase of cold refining has presented a very great difficulty and that is the swelling action which takes place at low temperatures in strong caustic solutions. This renders the pulp very difficult to handle mechanically and many patents concern themselves over schemes to avoid this.

Pulp Characteristics

As mentioned earlier, the amount of alpha-cellulose is not in itself an indication of the pulp's physical or chemical characteristics. Other physical or chemical data must be used along with alpha content in making any judgment of a pulp in this class. Among these tests the viscosity determination is probably most helpful. Where an alpha pulp is being used for paper requiring strength and durability, it is preferable to have the viscosity as high as possible for any given alpha content. However, if the alpha pulp is being used as a filler pulp for color and alpha content alone, the viscosity is not of great importance. In the dissolving grades, there is a very different situation, for it is quite often necessary to vary the viscosity over a wide range depending on the end use of the pulp. For instance, the specifications may require the viscosity to vary over a range as wide as 100% for a given alpha content.

In the manufacture of alpha pulp it is necessary first to determine the alpha content required. This will largely fix the conditions of the caustic extraction. The viscosity required will determine other conditions of cooking and bleaching. If a high viscosity is required the unbleached pulp will be cooked accordingly, such as in the case of papermaking pulps. This viscosity will range from 600 to 700 cupraethylenediamine centipoises. For dissolving grades where a low viscosity is demanded, the unbleached pulp, as a rule, will be cooked down very soft with a viscosity of 125 to 200 cupraethylenediamine centipoises. This well illustrates the wide range in viscosity that can be delivered from the digesters. The control of the final viscosity is preferably done in the hypochlorite bleaching stage after the caustic extraction. In some processes this bleaching may come before the caustic extraction or it may be used both before and after. By varying such conditions as pH, temperature, time, and bleach liquor concentration, it is possible, in a correctly designed bleach plant to not only maintain a desired viscosity within very narrow limits but also to vary the viscosity, at will, over a wide range. This can be done without changing the alpha content materially.

The data in Table II derived from different alpha pulps show how little relationship there is between alpha-cellulose content, viscosity, and bursting strength as developed in a Valley beater.

TABLE II

	No. 1	No. 2	No. 3	No. 4	No. 5
Alpha-cellulose %	92.7	95.5	93.2	92.3	91.1
Viscosity (TAPPI—T-206)	44	17	39	36	46
Burst after 3 hours	101	17	82	71	87

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Resinous Ion Exchange Applications*

By Edward R. Mueller [1]

Abstract

Until the development of satisfactory resinous anion adsorbents the process of deionization, whereby water comparable to U. S. P. *single distilled water is obtained, was not commercially feasible. Deionization represents an advanced step in water conditioning over the heretofore restricted applications of siliceous and carbonaceous zeolites. Moreover, the work of Adams and Holmes led to the development of resinous cation exchanges having properties, not exhibited by the zeolites, which insure higher quality treated waters. The use of deionization of water is widespread, due, in part, to the low cost. Deionization itself is not restricted to water conditioning processes alone, but can be employed in many and varied applications.*

In broaching the subject of water conditioning, particularly when carried out by ion exchange processes, it has been customary heretofore to review the past history of base exchange. However, since a comprehensive bibliography on the existing literature as well as an excellent history of exchange materials has been previously presented by Myers and co-workers *(11, 12, 13)*, only a brief summary of this information will be included in this paper.

The first observations on the base exchange phenomena are generally accredited to Way *(16)*. who, in 1850, studied the exchange reactions that took place in soils. Other investigators continued the research in natural occurring zeolite and humus materials. It was not until 1906, however, that the first commercial application, employing zeolite, was made for water softening as the result of work carried out by Gans *(5)*. Research continued, both in the development of higher capacity "synthetic zeolites" as well as in the study of acid treated humic materials that eventually led to the production, in about 1930, of sulphonated coals that are known today as "carbonaceous zeolites." As the result of the work initiated by Adams and Holmes *(1)* and announced in England in 1935, a resinous type exchange material was made possible. This development was a radical departure not only in the field of water conditioning materials but in the field of resin technology as well. For whereas previously the accepted utility of a synthetic resin had been judged primarily by the physical properties of the material, such properties as hardness, elasticity, solubility, and viscosity, Adams and Holmes showed that a polyhydric "C" stage phenol-formaldehyde resin would exhibit base exchange phenomena.

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 14-17, 1944.

[1] The Resinous Products & Chemicals Co., Philadelphia, Pa.

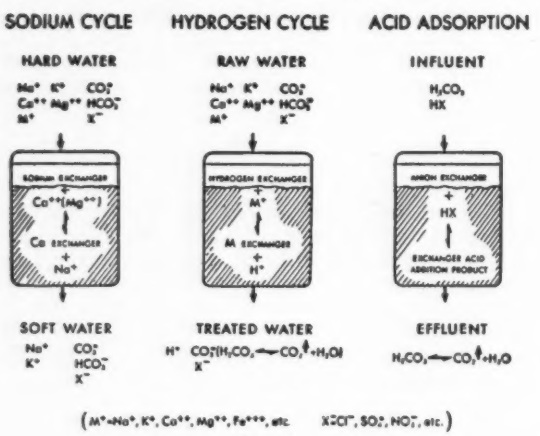

FIG. 1
Exchange Processes

Action of Zeolites

The zeolite materials, known as greensands when occurring naturally, or synthetic gel zeolites when prepared commercially, are sodium alumino-silicates having an insoluble, more or less porous structure. Within this structure are loosely bound sodium ions which exchange for other cations when brought in contact with solutions of inorganic salts. The exchange of sodium for calcium is stoichiometric and forms the basis for the removal of hardness from water supplies. Since the reaction is reversible and governed by the laws of mass action, an excess of sodium chloride may be used to regenerate the zeolite and replace the sodium ions within the lattice. Regeneration, on the other hand, is never effected with a high degree of chemical efficiency. Practically all cations are exchanged on the sodium alumino-silicate, although the exchange for hydrogen and certain large ions gradually leads to the disintegration of the zeolite lattice. Moreover, similar disintegration through the loss of silica takes place in waters of high pH or in those which are low in silica content. Despite these restrictions which limit the fields of application, greensands and synthetic gel zeolites are still employed today for domestic, industrial, and municipal water softening wherein the regeneration is carried out with brine solutions.

As employed for softening purposes, the siliceous zeolites operate in what is termed the "sodium cycle" (Fig. 1). The use of the sodium cycle alone, however, has several inherent disadvantages for various applications wherein a hardness-free water is desirable; e.g., on a chemical equivalence basis, two sodium ions must be substituted for every calcium or magnesium ion removed and the resulting water is actually higher in total solids. Moreover, bicarbonate salts are converted to sodium bicarbonate which is undesirable in boiler feed water, in beverage manufacture, and other applications. To combat this deficiency and permit the exchange of hydrogen ions for all cations, the so-called "carbonaceous zeolites" were developed. These materials are prepared by the sulphonation of humic compounds such as coal, wood, lignite, etc. Regeneration of these zeolites can be carried out with either sodium chloride, or with dilute mineral acids whereby the exchanger operates in the "hydrogen cycle." Utilization of the hydrogen cycle of these zeolites for the reduction of alkalinity and total solids as well as softening has been covered in detail in previous papers *(2, 3)*. Briefly, however, the reactions that take place can be illustrated by the Figs. 2 and 3. During the passage of the water

through the exchange material all of the salts are converted to the corresponding acids, bicarbonate salts to carbonic acid, and the mineral acidity can be neutralized with the alkalinity present in either the raw water or previously softened water. Thus, assuming that the raw water contains a high proportion of bicarbonate salts, it would be possible to reduce the solids content of the treated water to very low values.

Action of Resins

When one considers the physical structure of these exchange materials it can be seen that they are essentially large insoluble molecules which have available for ion exchange certain active groups. In the condensation of phenol with formaldehyde it can be shown that certain hydrogen atoms, namely those of the phenolic groups, do not take place in the reaction, see Fig. 5. When such a resin has been converted to its insoluble "C" stage, these same hydrogen groups, being acidic in nature, should remain available for the exchange of ions. With this in mind it was demonstrated by Adams and Holmes that exchange reactions actually did take place when solutions of salts were passed over a column of granular particles of the resin. Regeneration of these resins, moreover, could be accomplished with dilute mineral acids and cyclic operation was possible. Whereas monohydric phenol will give a resin having exchange properties, the more efficient types generally are prepared from a polyhydric phenol base. Moreover, since these types have definitely limited capacity, further research has demonstrated that high capacity resinous cation exchangers can readily be prepared by introducing into the resin nucleus methylene sulphonic acid groups. Such resinous cation exchangers are able to undergo regeneration with either salt or acid and thus can enter into all of the reactions which have previously been described *(11, 12)*.

Adams and Holmes reasoned further that an amine formaldehyde resin could undergo acid absorption whereby acids would be molecularly but reversibly "fixed" to the resin. Such adsorption can be considered analogous to the formation of amine salts such as might take place between ammonia and hydrochloric acid. The acids are bound reversibly and when the capacity of the resin becomes exhausted, the acid can be removed and the resin returned to its

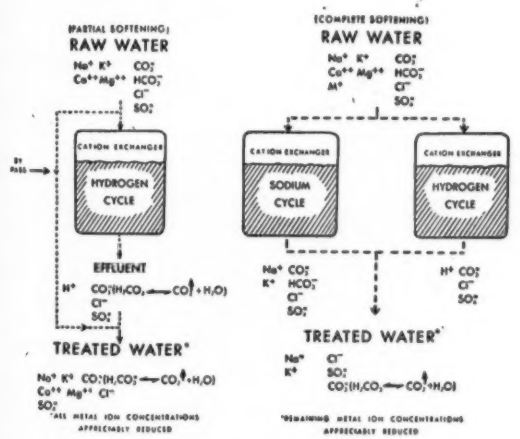

FIG. 2 FIG. 3

Reduction of Alkalinity

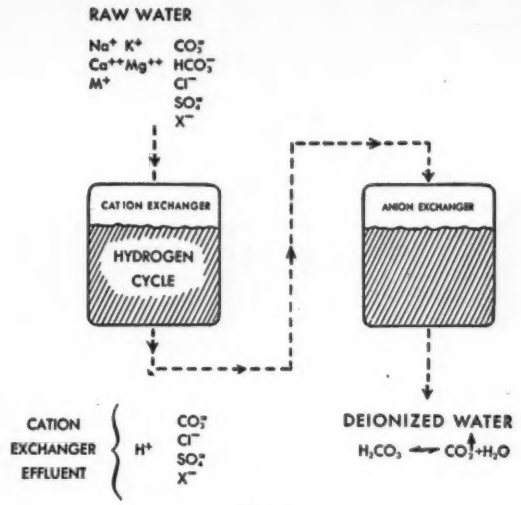

FIG. 4

Deionizing

"free base" form by regeneration with an alkali such as sodium carbonate.

Actually, anion exchange reactions can take place but such reactions are dependent to some extent on the preferential adsorption exhibited by the anion adsorbent. For example, it is possible to pass over the hydrochloride form of the anion adsorbent a solution of Na_2SO_4 and obtain NaCl in the effluent.

The four types of reactions possible with the resin-

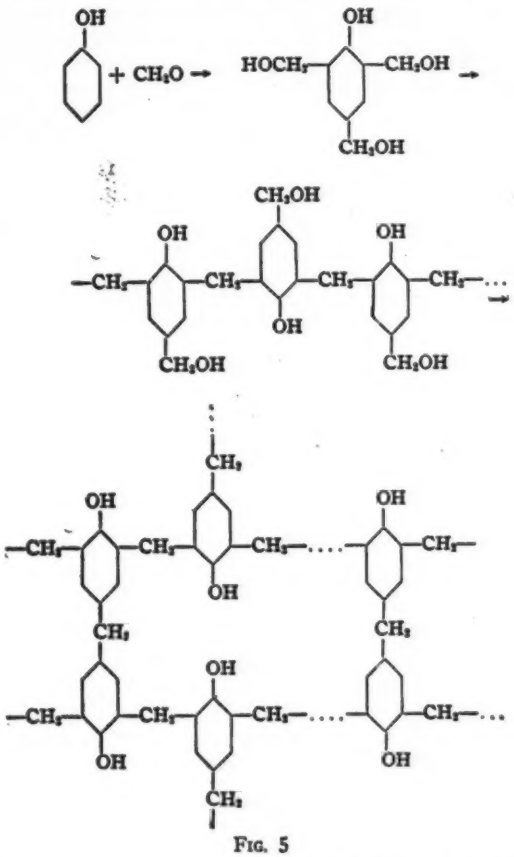

FIG. 5

ous ion exchange materials can be summarized by the following equations:

Sodium Cycle Cation Operation

$$NaR + MX \rightleftarrows NaX + MR$$

Hydrogen Cycle Cation Operation

$$HR + MX \rightleftarrows HX + MR$$

Acid Adsorption

$$R \cdot NH_3 + HX \rightleftarrows RNH_3 \cdot HX$$

Anion Exchange

$$R \cdot NH_3 \cdot HX + HY \rightleftarrows R \cdot NH_3 \cdot HY + HX$$

It is quite obvious that the reactions typified by the second and third equations could be combined so that one could obtain thereby a water which would be altogether free of dissolved salts (Fig. 4). It was this possibility that was first made commercially feasible by the discovery of Adams and Holmes and the resulting development of resinous anion exchangers. Following treatment with the hydrogen form of the cation exchanger, the acids that are formed from the soluble salts present in the water being treated (with the exception of carbonic acid) are adsorbed by the anion adsorbent leaving a water which is comparable and very often superior to single distilled water. This process has been referred to as deionizing or demineralizing.

Applications

When one considers that in the past it has been generally recognized that the only method of producing very pure water was by distillation, whether by specially designed stills or through industrial condensation, then the import of this method becomes obvious. Not only is it possible to produce deionized water in quantities and at rates heretofore not deemed feasible, but the costs, either for the initial installation or for operation, are considerably lower. It requires very little imagination to visualize the many industries in which the preparation of such a water can be utilized with advantage. Already the pharmaceutical, distilling, synthetic chemical, rubber, and numerous other industries have deionizing equipment in operation.

The quality of deionized water is to some extent dependent upon the quality of the raw water since neither silica nor nonionic organic impurities are removed in the exchange process and will appear in the final effluent. Several processes *(17)* are known, however, which can be employed to pretreat the deionized feed water so that a final effluent of excellent quality may be obtained. An analysis of a typical deionizer effluent from equipment employing the "Amberlite" ion exchange resins is shown in the following table. The analysis of the condensate which it replaced is shown for comparison.

TABLE I.—COMPARISON OF RAW AND DEIONIZED WATERS AND CONDENSATE

	Raw Water	Deionized Water	Condensate
Total dissolved solids, p. p. m.	117.9	6.9	3.9
Volatile matter, p. p. m.	39.6	2.5	2.6
Inorganic material, p. p. m.	78.2	4.4	1.3
Iron, p. p. m.	0.07	0.01	0.25
Silica, p. p. m.	2.0	2.0	0.25
pH	6.9	6.7	6.3
Conductivity, reciprocal ohms	..	3×10^{-6}	7×10^{-6}

Of interest to many potential users of deoinized water is its purity as measured by U. S. Pharmacopoeia specifications. Harrison, Myers, and Herr *(6)* have discussed this question in detail, showing that resinous exchangers produce water equal in quality to that required by U. S. P. specifications. Furthermore, biological tests indicated that the pyrogen content of the treated water was unaffected by the exchange treatment. It is on the basis of this and related work that the Pharmacopoeia now have under consideration an addition to the description of water used for pharmaceutical purposes that will permit the use of deionized water wherein it meets the specifications for distilled water.

In the course of their study on the suitability of deionized water in nutrient cultures, Liebig et al *(9)* have shown that resinous exchangers can produce on repeated treatment a water which is far superior insofar as heavy metal content is concerned to water redistilled in an all Pyrex glass still. Moreover, at the same time ,they have given a comparison of deionized water with distilled water which includes a spectrographic analysis. Very comparable data were obtained using the same exchange resins, in deionizing Philadelphia tap water. The analysis carried out by Dr. G. R. Harrison of M. I. T. by spectrographic means is shown in the following table.

TABLE II.—SPECTROGRAPHIC ANALYSIS OF MINERAL-FREE PHILADELPHIA WATER TREATED WITH RESINS

Element	Concentration, Mg./L.
Silicon	0.06
Calcium	0.06
Iron	0.03
Magnesium	0.016
Sodium	Less than 0.016
Copper	Less than 0.016
Manganese	Less than 0.016
Aluminum	Less than 0.016
Chromium	Less than 0.016
Zinc	Absent
Lead	Absent

These data serve to indicate an important factor in determining the quality of deionized water. Although the rapid general acceptance of the deionization process has been primarily due to the advent of suitable resinous anion absorbents, the quality of the deionized water is still dependent on the effective splitting of the inorganic salts to the respective acids by the cation exchanger. It has been reported *(15)* that the quality of the effluent of a carbonaceous type cation exchanger is dependent upon the quantity of acid employed for regeneration, the quality of course improving with increased quanties of acid. This is substantiated by the report of Kemmer and Thompson *(7, 8)* that carbonaceous type cation exchangers are not able to split sodium salts 100% so that the effluent will not be entirely free of these dissolved salts. These data were found to be true by other investigators who commented upon the work of Kemmer and Thompson *(8)*. Such variations in quality with regeneration quantities or incomplete splitting of sodium salts have not been observed in the operation of resinous cation exchangers that have been thoroughly tested.

The deionization process is by no means limited to the field of water conditioning and its utilization for the special applications of various process industries has been outlined quite completely by Myers *(10)*. Such applications to date include the treatment of sugar juices wherein removal of inorganic salts (ash) have been as high as 98%, and a similar process in the production of a palatable artichoke syrup (originally described by Englis and Feiss *(4)*). A modified process has been employed successfully in the recovery of valuable acidic constituents in waste materials. Numerous other applications are under consideration, many of which have considerable promise of reaching a practical and successful conclusion.

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The Demineralization of Water by Ion Exchange*

By William E. Manring[1]

Abstract

Two newly developed synthetic ion-exchange resins, Ionac C-284 and Ionac A-293, cation and anion active resins respectively, are described. Particular attention is directed to their performance in a four-bed system, comprised of alternate beds of the cation and anion resins, as applied to the demineralization of water. Applications of the four-bed system in (1) the treatment of brackish water, (2) a portable disposable cartridge unit, and (3) a self-contained laboratory unit of 30 gallon per hour capacity, are described in detail.

A growing body of technical literature and an increasing number of commercial installations of ion-exchange resin plants for water treatment and chemical process work attest to the developing importance of ion-active resins in industrial applications. Viewed as insoluble acids, bases, or salts, capable of a high degree of chemical activity without losing their physical identity, the organic cation and anion exchange resins may well be considered as unique chemical tools whose full importance has yet to be realized.

The use of the familiar natural zeolites and their synthetic inorganic counterparts has been limited, because of their instability, to a relatively narrow range of pH values in the region of neutrality, which in turn has restricted their use to sodium cycle operation, i.e., the replacement of dissolved hardness metals in the water influent with sodium. New possibilities opened up with the devising of synthetic cation exchange materials, stable over a much wider range of pH values, whose use could be extended to operation on the hydrogen cycle. In a practical way, this added flexibility in operation meant that inorganic salts in the water influent could be converted to the corresponding acids by simple passage through a resin bed. It was a natural development that synthetic organic resins with the ability to bind the acids so formed should follow closely.

Two relatively new members of the class of synthetic ion-active organic resins are Ionac C and Ionac A, cation and anion exchange resins respectively, whose application to the problem of demineralizing water is discussed in the body of this paper.

Exchange Resins

Chemically, the cation active resin is a complex condensate in which sulphonic acid groups are bound as the active nuclei of ion-exchange. The anion active material is a melamine-insolubilized amine resin whose free amino groups function as acid-binding foci. The basic chemical and physical properties of the two resins are summarized briefly in Table I.

TABLE I.

	Cation	Anion
Potential initial capacity, grains $CaCO_3$/cu. ft...	18,000	20,000
Apparent density, lb./cu. ft.....	38	50
Moisture content, %	35	40
Screen analysis, % on 40-mesh.....	90	75
Appearance	Black, vitreous	White, vitreous

Both types are extremely resistant to mechanical abrasion, based upon the results of an experimental test in which a water slurry of each of the resins was circulated continuously through a centrifugal pump without undue loss of resin by attrition after 850 complete passes.

Chemical Reactions

The behavior of the resins in contact with more or less dilute solutions of inorganic electrolytes is theoretically described by the following equations:

Cation Resin
1a. $HZ + NaCl \rightleftarrows NaZ + HCl$
2a. $2HZ + Ca(HCO_3)_2 \rightleftarrows CaZ_2 + 2H_2CO_3$
3a. $2NaZ + H_2SO_4 \rightleftarrows 2HZ + Na_2SO_4$

Anion Resin
1b. $(RNH_3)Cl + NaOH \rightarrow RNH + NaCl + H_2O$
2b. $(RNH_3)HCO_3 + 2NaOH \rightarrow RNH + Na_2CO_3 + 2H_2O$
3b. $2(RNH_3)Cl + Na_2CO_3 \rightarrow (RNH_3)_2CO_3 + 2NaCl$
4b. $2(RNH_3)HCO_3 + Na_2CO_3 \rightarrow (RNH_3)_2CO_3 + 2NaHCO_3$
5b. $RNH + HCl \rightarrow (RNH_3)Cl$
6b. $RNH + H_2CO_3 \rightarrow (RNH_3)HCO_3$
7b. $(RNH_3)_2CO_3 + HCl \rightarrow (RNH_3)Cl + (RNH_3)HCO_3$
8b. $(RNH_3)_2CO_3 + H_2CO_3 \rightarrow 2(RNH_3)HCO_3$
9b. $RNH + NaCl + H_2O \rightleftarrows (RNH_3)Cl + NaOH$
10b. $(RNH_3)HCO_3 + NaCl \rightarrow (RNH_3)Cl + NaHCO_3$

Equations 1a and 2a delineate in conventional form the exchange of cations for hydrogen ions taking place during the passage of an ordinary water through the acid-activated form of the cation resin. The reaction is a reversible one, as noted, and the effluent will contain both salts and acids, the equilibrium concentration of salts being in proportion to the hydrogen ion concentration released in the bed. It is to be remarked that for this reason the exchange in the presence of bicarbonates is more complete, that is, the equilibrium proceeds more completely toward the right, than in the presence of chlorides and sulphates. By the same token the equilibrium shifts most nearly toward complete exchange in the hydroxide-HZ system since the extremely weak acid, water, is the product of reaction. Equation 3a depicts the fact that practical advantage of the reversibility of the exchange is

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[1] American Cyanamid and Chemical Corp., New York, N. Y.

taken by regenerating the cation resin with a relatively concentrated (3 to 5%) mineral acid solution.

By analogy to the behavior of the general class of amines, it is assumed that the anion resin undergoes salt formation in the presence of acids, and that its function is more properly viewed as acid binding rather than ion exchange. Under certain conditions, however, there appears to be justification for placing the latter interpretation on its behavior (see Equations 9b and 10b). The series of equations indicated for the anion resin describes the reactions it may undergo under a variety of conditions. Equations 1b and 2b indicate the formation of the free amine base resulting from the regeneration of the HCl and CO_2 exhausted forms of the resin with a 3 to 5% solution of caustic soda; 3b and 4b, regeneration of the same exhausted resins with sodium carbonate to form the completely carbonated derivative. Equations 5b through 8b depict the reactions of the anion resin in activated form toward a typical mineral acid and toward carbonic acid. Note that the exhausted form of the resin appears as the bicarbonate derivative, a relatively stable, approximately neutral salt. Equations 9b and 10b picture the splitting of a neutral salt, which appears to proceed to an appreciable extent under certain conditions, based on measurements of effluent pH. The several reactions which the anion type may undergo have been shown in somewhat elaborate detail because of their bearing on the four-bed system of demineralization.

Four-bed System for Demineralizing Water

The four-bed system for demineralizing water employs a multiple series of alternate cation and anion active beds, as the name implies. A schematic diagram indicating the forward flow of water through the system, together with a piping arrangement to provide for the operations of backwash, rinse, and regeneration, is shown in Fig. 1.

Following the backwash operation, whose purpose is to reorient the resin particles the first and third beds are activated with a dilute solution of sulphuric acid. In certain instances, notably when a high calcium-sodium ratio prevails in the influent water, the acid regeneration of the first bed is preceded by a sodium chloride activation in order to prevent the deposition of insoluble calcium sulphate in the bed during the subsequent passage of sulphuric acid. The second bed is ordinarily regenerated with caustic soda, and the fourth with a mixture of sodium carbonate and sodium bicarbonate, their relative proportions depending upon the bicarbonate content of the raw water. The purpose of the activation of the last bed in the manner described is to buffer that bed by forming a mixture of the carbonate and bicarbonate derivatives of the resin. A bed comprised of such a mixture theoretically has capacity for both mineral

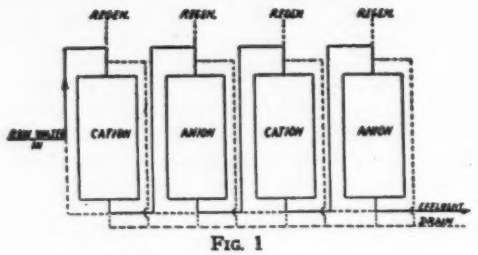

Fig. 1

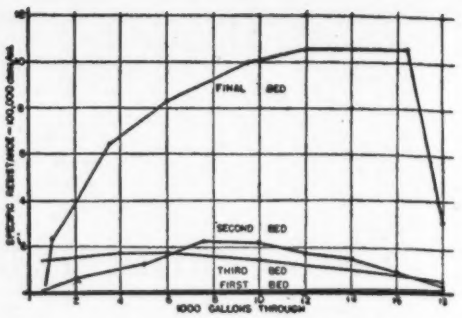

Fig. 2

Specific Resistance of City Water Treated in Four Bed System. Raw Water Equals 10,000 Ohms per ml.

acids and CO_2, and from practical experience delivers an effluent with a uniform pH in the range of 6.5 to 7.5 throughout the full active period of a run. All regenerants are made up in raw water solution.

In evaluating the performance of the four-bed system, particular attention is directed toward the quantity of desalted water obtained, and its quality in terms of ionized solids content, specific resistance, and pH throughout a run. A series of data which serves to illustrate performance in terms of those criteria are summarized below in Table III, and a series of graphs showing this data as well as the internal conditions of the system during the active period of a run is given ing Figs. 2, 3 and 4. The primary variable in each group of data is the solids content of the raw influent water, shown in Table II, and each set of data represents the average results of a series of runs.

TABLE II.—RAW WATER ANALYSES
(Parts per Million)

	City Water	Well Water	Synthetic Water
Total solids	58	346	...
Ca (as $CaCO_3$)	24.5	135	140
Mg (as $CaCO_3$)	12.0	49	...
Na (as $CaCO_3$)	7.5	41	94
SO_4 (as $CaCO_3$)	14.0	85	...
Cl (as $CaCO_3$)	6.5	32	234
M.O. alkalinity (as $CaCO_3$)	23.5	108	...
Total cations (as $CaCO_3$)	44	225	234
SiO_2	4	36	...

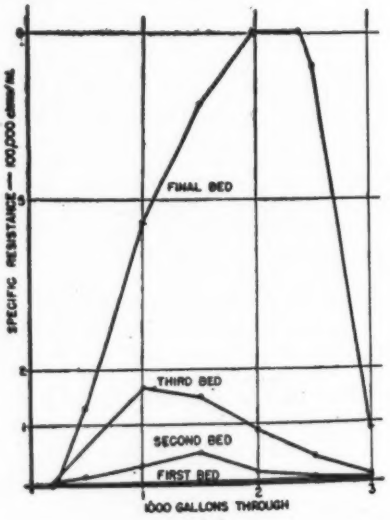

Fig. 3

Specific Resistance of Well Water Treated in Four Bed System. Raw Water Equals 3,000 Ohms per ml.

TABLE III.

Influent Water	Four Bed Effluent: Av. Quality: Quantity gals./cu. ft. Cation Resin	Av. Quality: N.V. Solids Less Silica	Av. Quality: Av. Spec. Resist. ohms/ml.	Av. Quality: pH
City (per Table II)	3500	0–1.5	400,000	6.5-7.5
Well (per Table II)	600	0–2	350,000	6.7-7.5
Synthetic (per Table II)	580	3.5	250,000	6-7

Operation Data

In order to give an integrated picture of four-bed results, a typical run on the well water whose analysis is given in Table II is examined in detail in the following discussion. Reference is made to Fig. 3 for descriptive data.

The system was comprised of two 3.0 cubic foot beds of cation resin and two beds of anion resin, each 3 cubic feet in volume. The regeneration schedule is shown below:

Bed 1 (cation)	15 lb. NaCl followed by 10 lb. H_2SO_4
Bed 2 (anion)	15 lb. NaOH
Bed 3 (cation)	10 lb. H_2SO_4
Bed 4 (anion)	10 lb. Na_2CO_3

All regenerant solutions were made up to 50 gallon volume in raw water. Each column was rinsed with approximately two column volumes (50 gal.) in order to displace excess regenerant. Following the rinse of the first cation bed with raw water, successive beds were rinsed in series. A total of 450 gallons, or about 40 gallons of rinse water per cubic foot of resin in the system, was necessary to achieve a resistance value of 100,000 specific ohms in the final effluent water.

A selected series of analyses taken during the run reveals the course of reactions within the system, and is summarized in Table IV.

It is apparent, for instance, that slow leakage of sodium takes place continuously through the first bed to the extent of about 4% of the total cations present in the influent water. This figure presumably represents the equilibrium concentration under the conditions indicated in the raw water analysis at a theoretical mineral acidity of 117 p.p.m. Note that at no time was calcium present in the effluent from the first bed. The pH of the effluent from the first bed remained constant at about 2.7 to 2.8 during the passage of 2200 gallons, and then slowly increased up to a pH of 6 as the bed approached exhaustion.

The second bed receives throughout the active period of the run an influent containing mineral acid, CO_2, and an equilibrium concentration of sodium in the form of the chloride, and functions by removing mineral acid, CO_2 as the bicarbonate derivative, and probably to split NaCl during the first part of the run. The pH of the second bed effluent varies from 11.8 down to 4.5, the lower portion of this range reflecting CO_2 displacement by mineral acid.

The third bed serves to remove the equilibrium concentration of sodium which leaks through the first cation bed continuously, and its steady effluent pH in the range of 4.5 indicates the replacement of this sodium with hydrogen ion.

The fourth bed receives then throughout the active period of the run an influent containing extremely low concentrations of mineral acid, and CO_2, removes these, and delivers an effluent practically salt-free with a pH in the range of 6.5 to 7.5.

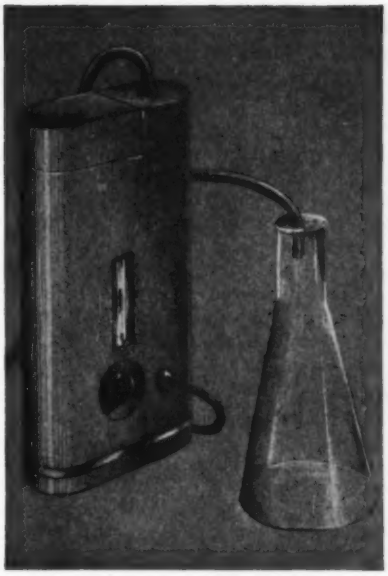

FIG. 5

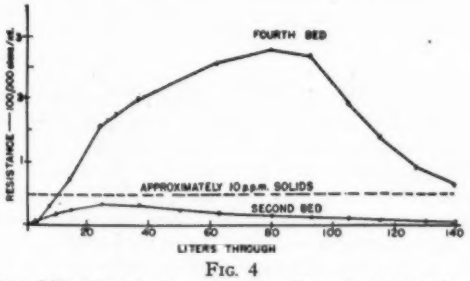

FIG. 4

Volume of Each Bed Is 51 cu. in. Raw Water is All Chloride Synthetic as per Table II

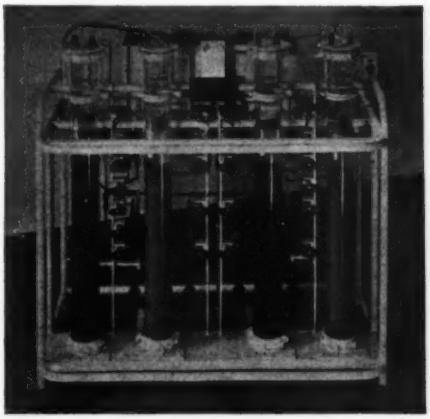

FIG. 6

TABLE IV.

Gallons through (× 100)	Bed 1: 5	Bed 1: 12	Bed 1: 20	Bed 2: 5	Bed 2: 12	Bed 2: 20	Bed 3: 5	Bed 3: 12	Bed 3: 20	Bed 4: 5	Bed 4: 12	Bed 4: 20
T.S. (sulphated)	32.6	28.6	46.2	17.7	13.8	81.0	4.7	6.8	50.0	3.2	16.8	48.2
Silica (as SiO_2)	25.0	23.4	25.0	5.0	7.0	30+	2.5	6.8	30+	3.0	16.8	30+
Na (as $CaCO_3$)	6.5	8.0	14.5	14.5	12.0	42.0	1.3	1.1	1.7	1.3	1.1	1.1
pH	2.7	2.6	2.7	10.1	9.9	6.3	4.2	4.9	4.3	8.1	7.7	7.0

It is notable that silica is removed, presumably as a derived acid, on the second bed during the early stages of the run and is later stripped from that bed by stronger acids such as the mineral acids and even carbonic acid. The same phenomenon takes place to a lesser degree on the fourth bed which is less basic in its reaction.

Attention is directed to the removal of silica because it is believed that this phenomenon is analogous to the removal of CO_2 in many ways. An anion resin bed activated with carbonate, for instance, exhibits capacity toward CO_2 in the early stages of a run, and its characteristic pH curve shows a traceable breakthrough of CO_2 in the later stages, which can be accounted for by the displacement of CO_2 with mineral acid.

In the particular run cited, 2500 gallons of demineralized water with a minimum specific resistance of 100,000 ohms per ml. was obtained. On the basis of the analysis of the raw water at 13.1 grains (as $CaCO_3$), the total capacity of the system was 33,000 grains, and assuming on the basis of first-bed effluent analyses that the third bed removed approximately 5% of the total cations, the capacity of the first bed was 10,500 grains per cubic foot. Because the third bed capacity is used to a relatively small extent in any given run, it can be used for several cycles without regeneration following its initial regeneration. The capacity of the anion resin in the system figures out to about 6,000 grains per cubic foot, to the point where carbon dioxide begins to break through the fourth bed.

The principles underlying the use of the four-bed system to demineralize ordinary waters of up to 300 p.p.m. salt content have been extended with decided success to the problem of treating brackish water running as high as 7,500 p.p.m. dissolved salts in order to effect reduction of solids to a potable level, that is, less than 500 p.p.m. of salt. Although perhaps not of as widespread and immediate industrial interest as the problem of complete demineralization of water, a summary of results dealing with the treatment of a series of brackish waters is incorporated here because they further characterize the behavior of the four-bed system under the most stringent conditions.

The physical setup differed in no substantial detail from the ordinary equipment shown schematically in Fig. 1. The usual sequence of operations—backwash, regeneration, downflow rinse, and downflow run to salt break-through beyond the specified limit—was followed. The regenerant solutions were made up with raw brackish water, and the operations of backwash and rinse carried out with the same type of water. Control of the unit operation was effected by a rotameter on the influent line and a conductivity alarm to determine the end point of a run.

The results of a series of runs are summarized in Table V.

TABLE V.—SUMMARY OF TEST RUNS ON BRACKISH WATER

TDS In-	Thru-put	Time	Acid	Soda Ash	Average Quality of Effluent, p.p.m. as $CaCO_3$			
fluent	gals.	hr.	lb.	lb.	Alk.	Cl	SO_4	TDS
2000	34,560	67.6	750	750	205	125	TR	330
3500	14,750	43.9	750	750	444	296	TR	740
5000	8,275	31.6	750	750	588	317	TR	905
7500	3,500	23.7	960	750	785	500	TR	1285

RESIN CONTENT OF BEDS

Bed No.	Type	Volume cu. ft.
1	Cation resin	5.38
2	Anion resin	4.62
3	Cation resin	4.62
4	Anion resin	3.62

No potable water at all was produced by the first two beds alone in the case of feed water containing 6000 p.p.m. total dissolved solids, while the four-bed system produced 35,000 pounds of potable water per 20-hour day at a weight efficiency of 29 to 1. Below 6000 p.p.m. the two bed system was less efficient than the four-bed system because much of the capacity was lost in rinsing to potable quality and in early leakage of salt. In the four-bed system this maximum capacity of the first two beds is fully utilized, because the rinse water from the first two beds is used as feed water for the last two beds before it is potable, and because considerable reduction in total solids is effected by the first beds after their effluent is so highly saline as to be nonpotable.

Equipment

The four-bed system for demineralizing water has been applied with unique advantage in certain small size units which are described below.

The name "Filt-R-Stil" has been adopted for a self-contained portable unit in which a "throw away" cartridge of resin serves as the active desalting tool. The cartridge is prepacked with the four beds of fully activated resin in the same sequence as they appear in a full scale plant. The cartridge must necessarily be moistureproof in order to preserve the full activity of the resins. The present cartridge is constructed of paperboard impregnated with a moistureproof asphalt base material, and to date typical cartridges have withstood storage for nine months without any decrease in resin capacity. In operation, the friction caps are removed from each end of a cartridge, and it is inserted into the apparatus, connections at top and bottom being made by means of rubber adapters. The raw water inlet connection is made with either a pressure source or a gravity feed tank, and the water flowed upward through the cartridge and thence to the outlet. Control over water quality is effected by an electronic conductivity circuit which acts to automatically shut off the water flow when the specific resistance of the effluent water is less than 50,000 ohms per ml., corresponding to a maximum ionized salt content of 8 to 10 p.p.m. (as $CaCO_3$). The unit is designed to operate at approximately 10 gallons per hour flow rate, and the capacity of a cartridge is equivalent to a salt removal of 400 to 500 grains as $CaCO_3$. The latest model is shown in Fig. 5.

Laboratory Unit

The laboratory type is designed to furnish demineralized water at the rate of 30 to 50 gallons per hour. The resin columns are Pyrex glass, and corrosion-resistant piping is used throughout. The demineralizing operation is controlled by an electrical conductivity alarm circuit which indicates when the resistance of the effluent is above or below a specified setting.

The laboratory unit is a regeneratable type, and its operation is analogous in every way to the operation of a full scale plant. Fig. 6 illustrates the present model of this unit. It is worth remarking, too, that the smaller type is designed for flexible operation, and that it can serve alternatively as a prepilot plant for ion-exchange process investigation.

WRIGHT-HIBBARD

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INCORPORATED

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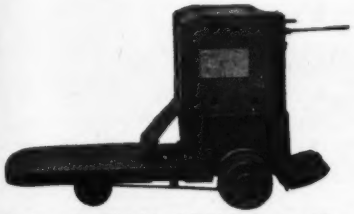
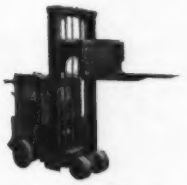
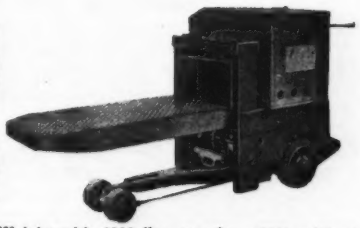
WRIGHT TRUCK



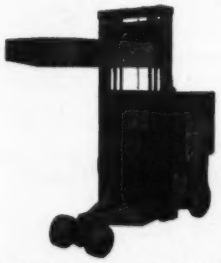
Platform size 24 x 42 x 11" high, low position; 15" high when elevated. Capacity: 2000, 3000, and 4000 pounds.



Capacity 2000 lbs. on forks 30" long. Truck turns from a 5' aisle into an intersecting aisle of 5'.

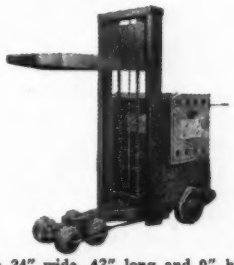


Weight with 4000 lbs. capacity—2850, without battery. Truck turns from a 5' 4" aisle into an intersecting aisle of 4'.



Platform 24" wide, 53" long and 11" high, low position. Capacity 2000, 3000 and 4000 pounds.

The Wright-Hibbard Telescoping high lift truck is designed to operate in the most congested areas of factories and warehouses. The exceptionally narrow width and short overall length found in other Wright-Hibbard trucks are retained in this model.



Platform 24" wide, 42" long and 9" high, low position. Weight with 4000 lb. capacity—2800 without battery.

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Wood Pulp & Paper Agents

60 East 42 Street
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New York Paper and Pulp Market Review

Less Paper For Civilians Expected In Future—More Sulphate Pulp May Be Used For Nitrating Purposes—Mill Buying of Cuttings Active—Paper Stock Receipts Increasing—Other News

Office of the PAPER TRADE JOURNAL,
Wednesday, September 20, 1944.

Inadequate civilian supply of many paper items is likely to become more acute according to current reports. Military and government requirements, the Department of Commerce reports, are now at the highest level ever reached, and with paper, pulpwood, wood pulp and waste paper in group one on the Critical Products list, civilian supplies of wrapping paper and bags in particular, are expected to remain tight in the final quarter of this year. Reports also indicate that production in most mills has not increased, because of lack of manpower in handling wood and also in mill operations. The current problem of maintaining output is, therefore, not simply the harvesting of more pulpwood and collecting more waste paper. The manpower factor has slowed down output in all industries.

Paper production for the week ended September 9, a holiday week, was estimated at 75.8%, compared with 74.6% for 1943, with 70.3% for 1942, with 104.2% for 1941, and with 85.2% for the corresponding week for 1940.

Paper board production for the week ended September 9 was 80.0%, compared with 83.0% for 1943, with 65.0% for 1942, with 98.0% for 1941, and with 76.0% for the corresponding week for 1940.

Wood Pulp

Less sulphate wood pulp for paper and board are indicated in current plans which will require more sulphate pulp for nitrating purposes. The trend in pulpwood production continues upward; waste paper receipts at the mills continues upward and new supply of woodpulp continues its downward trend.

Wood pulp output in the U. S. for the first seven months of 1944, totaled 5,776,000 tons, the Department of Commerce reports, compared with 5,541,000 tons for the same period in 1943. This is an increase of 4.2%. Exports aggregated 113,000 tons for the seven month period in 1944, compared with 158,000 tons in 1943, which is a decrease of 28.5%.

Rags

New cotton cuttings continue in active demand at this date. The market is strong under steady purchasing by mills. Prices are firmly maintained at ceiling levels.

Old cotton rags are active under heavy demand by roofing mills for whites. Blues and other grades are in slow to fair demand at this date.

Old Rope and Bagging

No change of importance has been reported this week in the old rope market. Control over the importation of dressed istle continues.

The old bagging market continues to show signs of improving but lack of acceptance of prices by buyers keeps trading at a low level. Prices are nominal.

Old Waste Paper

Waste paper receipts declined during June and July from the year's high reached in May, but held up well during the other summer months.

Total receipts of paper stock, reported by the Department of Commerce, for the seven months of 1944, were 4,851,000 tons, compared with 4,081,000 tons for the same period in 1943. Total consumption was 4,849,000 tons, compared with 4,301,000 tons in 1943. Inventories aggregated 734,000 tons in 1944, compared with 577,000 tons for the period in 1943. The trend of mill receipts continues upward.

Twine

Sales and deliveries of seine twine, hawser, and cabled cord, are restricted under Direction to M-328, 8-2-44, which became effective on August 15, 1944.

No change of importance has been reported in prices, demand or supplies during the current week.

Discuss Foreign Paper Trade

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 20, 1944—The sub-committee on Foreign Trade of the Pulp and Paper Industry Council met here last week with representatives of the Departments of State and Commerce and War Production Board. The whole foreign trade situation was canvassed from the standpoint of the paper industry.

Among those attending the conference were R. K. Ferguson, president St. Regis Paper Company; Norman W. Wilson, president and general manager Hammermill Paper Company; George Olmsted, Jr., vice president, S. D. Warren Company; Amor Hollingsworth, president Penobscot Chemical Fibre Company; and Cola G. Parker, president, Kimberly-Clark Corporation.

Ex-officio members attending the conference were: F. K. Brown, president and general manager, Neenah Paper Company; and E. W. Tinker, secretary American Paper and Pulp Association; State Department; Bernard Haley; William Easton, War Production Board; Dr. Egon Gleisinger, United Nations Interim Committee on Foods and Agriculture and N. L. Neubrech, Department of Commerce.

W. J. Bailey Made Vice President

William J. Bailey of White Plains, N. Y., was elected a vice president of West Virginia Pulp and Paper Company at a regular meeting of the board of directors of the company held this week, according to an announcement by Thomas Luke, president.

Mr. Bailey has been with the company for ten years as general traffic manager. Last year he was placed in charge of the company's woodlands, purchasing and traffic departments.

Prior to his association with West Virginia Pulp and Paper Company, Mr. Bailey served in the traffic departments of General Motors, Durant Motors and Electric Auto-Lite Company. He was also associated with the railroads for several years.

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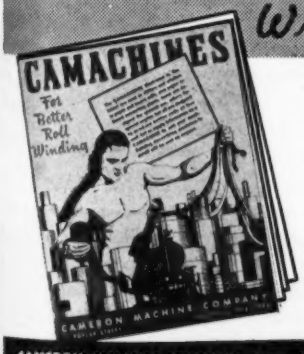

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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, September 20, 1944.

BLANC FIXE—Prices on blanc fixe continue to conform to prevailing levels. Demand is reported fair. The pulp is quoted at $40 per ton, in barrels, at works. The powder is quoted at $60 per ton, f.o.b. works.

BLEACHING POWDER—Government demand is reported heavier. Production is heavy and the balance between supply and demand is reported slight. Quotations are unchanged. Bleaching powder is currently quoted at from $2.50 to $3.10 per 100 pounds. All prices in drums, car lots, f.o.b. works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound f.o.b. shipping point.

CAUSTIC SODA—Demand very heavy. Production heavy, but under demand. Prices unchanged. Solid and flake scarce. Solid caustic soda is currently quoted at $2.30 per 100 pounds. The flake and ground are currently quoted at $2.70 per 100 pounds. All prices in drums, car lots, f.o.b. works.

CHINA CLAY—Current demand is reported moderate on many grades of china clay. Quotations unchanged. Domestic filler clay is quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mines. Imported china clay is currently quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Military demand heavier with market reported a little tighter at this date. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b. works.

ROSIN—The rosin market reports higher prices on some grades this week. "G" gum rosin is currently quoted at $5.45 per 100 pounds, in barrels, at Savannah. "FF" rosin is currently quoted at $5.44 per 100 pounds, in barrels, at New York. Seventy per cent gum rosin size is currently quoted at $5.72 per 100 pounds, f.o.b. works.

SALT CAKE—Prices on salt cake continue to be reported unchanged. Demand fair during the current week. Domestic salt cake is currently quoted at $15 per ton, in bulk. Chrome cake is currently quoted at $16 per ton. All quoted prices in car lots, f.o.b. shipping point.

SODA ASH—Heavy demand for soda ash is reported to absorb current production. Market reported tight. Prices continue to conform to prevailing levels. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prospects of more corn are reported uncertain as cash corn offerings are only fair. Demand continues heavy and in excess of current supplies. Prices unchanged on starch. Pearl is quoted at $3.72 per 100 pounds. Powdered starch is quoted at $3.83 per 100 pounds. All prices in bags, car lots f.o.b. Chicago.

SULPHATE OF ALUMINA—Demand good. Supply situation is reported satisfactory for the week. Prices of the commercial grades are currently quoted at from $1.15 to $1.25 per 100 pounds. The iron free is currently quoted at $1.85 per 100 pounds. All prices in bags, car lots, f.o.b. works.

SULPHUR—Current consumption of sulphur continues heavy. Market situation unchanged. The quotation on annual contracts continues at $16 per long ton, f.o.b. mines. The current price on contracts at Gulf Ports is $17.50 per long ton.

TALC—Demand reported moderate. Domestic grades are currently quoted at from $16 to $21 per ton at works.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—			
Roll, contract	*$58.00	@	—
Sheets	66.00	"	—
* OPA Maximum Price.			
Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill			
Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—
* OPA Manufacturers' Prices.			
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Toilet—1 M. Sheets—Per Case			
Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.20	"	—
Bleached, Jr.	3.20	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
No. 2 Manila Wrapping, 35 lb.	5.75	"	6.00
Boards, per ton—			
News	*48.00	@	—
Chip	*48.00	"	—
Sgl. Mla. Ll. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.10 @	$46.00	$40.25 @	$47.25
100% Rag	32.20 "	37.75	33.35 "	39.25
85% Rag	.... "	....	29.90 "	35.00
75% Rag	23.00 "	27.00	24.15 "	28.25
65% Rag	.... "	....	22.80 "	27.75
50% Rag	18.70 "	22.75	19.90 "	24.25
25% Rag	16.40 "	20.00	17.55 "	21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$10.55 @	$12.75	$11.70 @	$14.25
No. 2	9.65 "	11.75	10.80 "	13.25
No. 3	9.20 "	11.25	10.35 "	12.50
No. 4	8.90 "	10.75	10.05 "	12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65 @		$15.50
No. 2 Glossy Coated	12.40 "		14.00
No. 3 Glossy Coated	11.60 "		13.25
No. 4 Glossy Coated	11.15 "		12.75
No. 1 Antique (watermarked)	10.25 "		11.75
No. 2 Offset	9.60 "		11.00
A Grade E. F.	9.35 "		10.75
A Grade S. & S. C.	9.60 "		11.00
B Grade E. F.	8.85 "		10.25
B Grade S. C.	9.10 "		10.50
C Grade E. F.	8.55 "		9.75
C Grade S. C.	8.80 "		10.00
D Grade E. F.	8.25 "		9.50
D Grade S. & S. C.	8.50 "		9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite	$86.00		
Unbl. Softwood Sulphite	74.00		
Bl. Hardwood Sulphite	83.50		
Unbl. Hardwood Sulphite	71.50		
Bl. Mitscherlich	81.00		
Unbl. Mitscherlich	72.00	@	82.00
N. Bleached Sulphate	86.00		
S. Bleached Sulphate	79.00		
N. Semi-Bleached Sulphate	82.00		
S. Semi Bleached Sulphate	75.00		
N. Unbl. Sulphate	73.00		
S. Unbl. Sulphate	63.50		
Bl. Soda	72.00		
Unbl. Soda	68.00		
Groundwood	50.00		

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	7.25*
Silesias No. 1	—	"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.50*

* OPA Maximum Prices.

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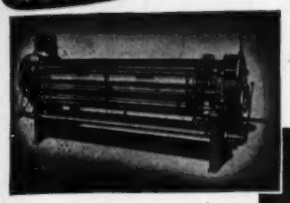
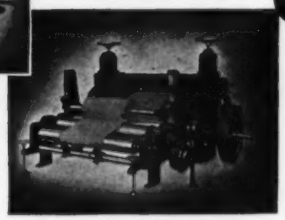


Only two of the many production machines in our line—complete details upon request.



THERE'S still a big job for all of us to do before Victory comes—but discuss today and be ready tomorrow. Early planning will help you do a better job when we can work in peace.

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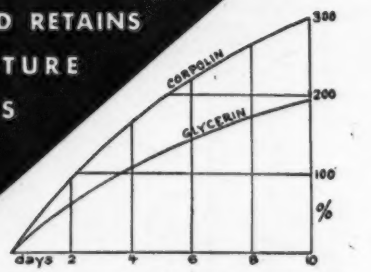

Moisture Attraction at 100% Rel. Hum. and 27° C.

*Patent Pending. Name Reg. U. S. Pat. Off.

CHARACTERISTICS: Colorless, heavy, odorless liquid; non-volatile, non-toxic. Resembles glycerin in appearance and feel.

USES: Plasticizing papers for food wrappers, glassine, waxed papers, draperies, etc.

AVAILABLE in any quantity without priority.

THE AKTIVIN CORPORATION
393 SEVENTH AVENUE • NEW YORK 1

K-121-B DEINKING — DECOLORIZING and COOKING PROCESSES K-C-2
THE KINSLEY CHEMICAL COMPANY
12500 Berea Road Cleveland, Ohio

MISCO "C"
THE CORROSION RESISTANT ALLOY
CAST • ROLLED • FABRICATED
for all equipment exposed to corrosion by sulphite acids
MICHIGAN STEEL CASTING CO., DETROIT 7, MICH.

DON'T GUESS! TEST R.P.M.

With a MODEL "J" **HAND TACHOMETER**
Triple Range:
300— 1200 R.P.M.
1000— 4000 R.P.M.
3000—12000 R.P.M.
RUGGED-RELIABLE-CONTINUOUSLY INDICATING TYPE
WRITE FOR BULLETIN #706
HERMAN H. STICHT CO. INC.
27 PARK PLACE NEW YORK N. Y.

Old Rags

White, No. 1—			
Repacked	*3.80		—
Miscellaneous	*3.20		—
White, No. 2—			
Repacked	*2.90		—
Miscellaneous	*2.65		—
Third and Blues—			
Repacked	*2.20		—
Miscellaneous	*1.80		—
Roofing Rags—			
No. 1	*1.55		—
No. 2	*1.45		—
No. 3 (bagging)	*1.35		—
No. 4	*1.35		—
No. 5A	*1.35		—
Old Manila Rope	5.75		—

*OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00		2.20
New Light Silesias	5.50		5.75
Light Flannelettes	5.50		5.75
New White Cuttings	7.00		7.50
New Light Oxfords	4.00		4.50
New Light Prints	3.00		3.25

Old Rags

No. 1 White Linens	7.50		8.50
No. 2 White Linens	6.50		7.50
No. 3 White Linens	4.50		—
No. 4 White Linens	2.25		3.25
No. 1 White Cotton	4.25		4.75
No. 2 White Cotton	3.25		3.75
No. 3 White Cotton	2.50		3.00
No. 4 White Cotton	1.90		2.20
Extra Light Prints	2.00		2.40
Ord. Light Prints	1.75		2.15
Med. Light Prints	1.55		1.95
Dutch Blue Cottons	2.25		2.50
French Blue Linens	3.00		—
Checks and Blues	2.00		—
Linsey Garments	1.90		2.00
Dark Cottons	1.50		1.60
Old Shoppercies	1.30		1.45
New Shoppercies	1.45		1.50
French Blues	2.25		2.50

BAGGING

(Prices to Mill, f. o. b. N Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.25	@	4.35
Wool Tares, light	4.25		4.50
Wool Tares heavy	4.50		5.00
Bright Bagging	4.50		4.85
Manila Rope—			
Foreign	—		—
Domestic	*5.75		—
Jute Threads	5.50		—
No. 1 Sisal Strings	*4.00		—
Mixed Strings	2.00		—

*OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½		—
No. 1 Hard White Shavings, unruled	4.87½		—
No. 1 Hard White Shavings, ruled	2.50		—
Soft White Shavings, one cut	2.87½		—
No. 1 Soft White Shavings	2.50		—
Soft White Shavings, Misc.	2.15		—
No. 1 Fly Leaf Shavings	1.67½		—
No. 2 Fly Leaf Shavings	1.12½		—
No. 1 Groundwood Fly Leaf Shavings	1.25		—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90		—
Mixed Colored Shavings	.75		—
Mixed Groundwood Colored Shavings	.90		—
Overissue Magazines	1.67½		—
No. 1 Heavy Books & Magazines	1.92½		—
Mixed Books	1.10		—
No. 1 White Ledger	2.30		—
No. 2 Mixed Ledger, colored	2.00		—
New Manila Envelope Cuttings, one cut	2.87½		—
New Manila Envelope Cuttings	2.65		—
Extra Manilas	1.95		—
Mixed Kraft, Env. & Bag Cuttings	2.75		—
Kraft Envelope Cuttings	3.25		—
Triple Sorted, No. 1 Brown Soft Kraft	2.50		—
New 100% Kraft Corrugated Cuttings	2.25		—
No. 1 Assorted Old Kraft	1.75		—
New Jute Corrugated Cuttings	.90		—
Old 100% Kraft Corrugated Containers	1.75		—
Old Corrugated Containers	1.40		—
Box Board Cuttings	.72½		—
White Blank News	1.65		—
Overissue News	1.10		—
No. 1 News	1.00		—
No. 1 Mixed Paper	.95		—
Old Corrugated Containers	.82½		—
Mill Wrappers	1.10		—

Twines

All Prices Nominal

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21		—
Fine Polished—			
Fine India	.26		—
Unpolished—			
Box	.17¼		—
Paper Makers	.17		—
Tube Rope	19		—
Wall Paper	.20½		—
Wrapping	.23		—
Soft Fiber Rope	.19		—
Cotton	.25		—

(Hard Fiber)

Medium Java	.18		—
Mex. Sisal	.16		—
Manila	—		—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill.)

Shirt Cuttings—	
New White No. 1	.07¼
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¼
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¼
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¼

Domestic Rags (Old)

White No. 1 — Repacked	3.80		—
Miscellaneous No. 1	3.20		—
Miscellaneous No. 2	2.65		—
White No. 2 - Repacked	2.90		—
Thirds and Blues—			
Miscellaneous	1.80		—
Repacked	2.20		—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55		—
Domestic No. 2	1.45		—
Roofing Bagging	1.35		—
Old Manila Rope	5.75		—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00		4.50
No. 1 Clean bright—			
Sisal Strings			.04
No. 2 Clean bright—			
Sisal Strings			.03
Sisal Jute	.02½		.02¾
Scrap—			
No. 1	3.25		3.50
No. 2	.75		1.50
Wool Tares	4.00		4.25
No. 1 New Light Burlap	3.00		4.00
New Burlap Cuttings	3.75		4.00

Old Papers

(F. o. b. Phila)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½		—
No. 1 Hard White Shavings, unruled	2.87½		—
Soft White Shavings, one cut	2.50		—
White Blank News	1.65		—
Soft White Shavings	2.15		—
No. 1 Fly Leaf Shavings	1.67½		—
No. 2 Fly Leaf Shavings	1.12½		—
No. 1 Groundwood Fly Leaf Shavings	1.25		—
No. 2 Groundwood Fly Leaf Shavings	.90		—
Mixed Colored Shavings	.75		—
New Manila Envelope Cuts, one cut	2.87½		—
Hard White Envelope Cuts, one cut	3.37½		—
Triple Sorted No. 1 Brown Soft Kraft	2.50		—
Mixed Kraft Env. & Bag Cuttings	2.75		—
Kraft Envelope Cuttings	3.25		—
No. 1 Heavy Books & Magazines	1.92½		—
New Manila Envelope Cuts, one cut	2.87½		—
New Manila Envelope Cuttings	2.65		—
White and Colored Tabulating Cards	2.25		—
Ground Wood Tabulating Cards	1.35		—
White Blank News	1.65		—
No. 1 Assorted Old Kraft	1.75		—
No. 1 Mixed Paper	.95		—
Overissue News	1.10		—
Box Board Cuttings	.72½		—
New Corrugated Cuttings, Kraft	2.25		—
Old 100% Kraft Corrugated Containers	1.75		—
Old Corrugated Containers	1.40		—
Jute Corrugated Cuttings	1.07½		—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	—	@	2.75
Sisal Rope No. 1	*4.75		—
Sisal Rope No. 2	*4.25		—
Mixed Rope	—		1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75		3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75		—
Soft Jute Rope	5.25		—
Jute Car Threads	3.00		3.50
Bleachery Burlap	8.50		9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	—		2.50
South American	—		3.00

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50		—
Soft White Shavings, Misc.	2.15		—
No. 1 Fly Leaf Shavings	1.67½		—
No. 2 Fly Leaf Shavings	1.12½		—
No. 1 Groundwood Fly Leaf Shavings	1.25		—
No. 2 Groundwood Fly Leaf Shavings	.90		—
Mixed Colored Shavings	.75		—
New Manila Envelope Cuts, one cut	2.87½		—
Hard White Envelope Cuts, one cut	3.37½		—
Triple Sorted No. 1 Brown Soft Kraft	2.50		—
Mixed Kraft Env. & Bag Cuttings	2.75		—
Kraft Envelope Cuttings	3.25		—
No. 1 Heavy Books & Magazines	1.92½		—
New Manila Envelope Cuts, one cut	2.87½		—
New Manila Envelope Cuttings	2.65		—
White and Colored Tabulating Cards	2.25		—
Ground Wood Tabulating Cards	1.35		—
White Blank News	1.65		—
No. 1 Assorted Old Kraft	1.75		—
No. 1 Mixed Paper	.95		—
Overissue News	1.10		—
Box Board Cuttings	.72½		—
New Corrugated Cuttings, Kraft	2.25		—
Old 100% Kraft Corrugated Containers	1.75		—
Old Corrugated Containers	1.40		—
Jute Corrugated Cuttings	1.07½		—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	—	@	2.75
Sisal Rope No. 1	*4.75		—
Sisal Rope No. 2	*4.25		—
Mixed Rope	—		1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75		3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75		—
Soft Jute Rope	5.25		—
Jute Car Threads	3.00		3.50
Bleachery Burlap	8.50		9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	—		2.50
South American	—		3.00
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25		
Aust. Wool Pouches	—		3.25
New Zealand Wool Pouches	—		3.50
New Burlap Cuttings	4.75		5.00
Heavy Baling Bagging	4.00		4.25
Paper Mill Bagging	2.50		3.00
No. 2 Roofing Bagging	1.35		—

*OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¼		.03
New White No 1	.06¾		.07
New Light Flannelettes	.05½		.06
Canton Flannels, Bleached	.06		.06½
Underwear Cutters, Bleached	06¼		06¾
Underwear Cutters, Unbleached	.05¾		.06
Silesias No. 1	06		.06¾
New Black Silesias	.03		.03½
Red Cotton Cuttings	.03½		.04
Soft Unbleached	.06½		.06¾
Blue Cheviots	.05½		.06
Fancy	.02¾		—
Washable	.02¾		—
Khaki Cuttings	.02¾		.03
O. D. Khaki	.03½		.03¾
Corduroy	.03¾		.03½
New Canvas	.06¼		.06¾
B. V. D. Cuttings	.06¼		.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20		—*
White No. 2—			
Miscellaneous	2.65		—*
Twos and Blues, Repacked	2.20		—*
Old Blue Overalls	2.25		2.50
Thirds and Blues, Repacked	2.20		—*
Miscellaneous	1.80		—*
Black Stockings	3.50		4.00
Roofing Stock—			
No. 1	1.55		—*
No. 2	1.45		—*
No. 3	1.35		—*
No. 4	1.35		—*
No. 5, Quality A	1.35		—*
Quality B	1.20		—*
Quality C	.95		—*
Old Manila Rope	5.75		—

*OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	1.37½		—
No. 1 Hard White Shavings, unruled	2.87½		—
No. 1 Soft White Shavings	2.50		—
No. 1 White Ledger	2.30		—
No. 1 Heavy Books & Magazines	1.92½		—
White Blank News	1.65		
Mixed Kraft Env. & Bag Cuttings	2.75		—
No. 1 Assorted Old Kraft	1.75		—
Overissue News	1.10		—
No. 1 News	1.00		—
No. 1 Mixed Paper	.95		—
No. 1 Rooing Rags	1.55		—
No. 1 Roofing Bags	1.45		—